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ABSTRACT

This report considers the role of manpower information in vocational education planning. Following a review of the manpower and educational contexts of vocational education planning, the report examines the concepts of manpower supply and demand and the sources of relevant information and methodologies for their estimation, considers criteria for determining vocational education priorities, and describes a method for allocating resources among vocational programs. From a review of alternative manpower educational planning models, including manpower, rate-of-return, and social demand approaches, elements were selected which were feasible for a modestly inexpensive planning system. The proposed system acknowledges the existence of more complex planning models, discusses the data inadequacies and costs preventing their complete implementation, and suggests a methodology feasible in terms of existing or relatively inexpensive data and methodologies. (BH)

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VOCATIONAL EDUCATION PLANNING

manpower priorities and dollars

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The Center for Vocational and Technical Education, an independent unit on The Ohio State University campus, operates under a grant from the National Center for Educational Research and Development, U.S. Office of Education. It serves a catalytic role in establishing consortia to focus on relevant problems in vocational and technical education. The Center is comprehensive in its commitment and responsibility, multidisciplinary in its approach and interinstitutional in its program.

The Center's mission is to strengthen the capacity of state educational systems to provide effective occupational education programs consistent with individual needs and manpower requirements by:

- Conducting research and development to fill voids in existing knowledge and to develop methods for applying knowledge.

- Programmatic focus on state leadership development, vocational teacher education, curriculum, vocational choice and adjustment.

- Stimulating and strengthening the capacity of other agencies and institutions to create durable solutions to significant problems.

- Providing a national information storage, retrieval and dissemination system for vocational and technical education through the affiliated ERIC Clearinghouse.

RESEARCH AND DEVELOPMENT
SERIES NO. 68

VOCATIONAL EDUCATION PLANNING: MANPOWER, PRIORITIES, AND DOLLARS

ROBERT C. YOUNG

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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HEALTH, EDUCATION AND WELFARE

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. . . it seems almost the logically necessary minimum condition of a satisfactory educational system that it effectively provide for the orderly functional preparation of people to assume positions within the economic institutions of society.

Thomas I. Green
"Schools and Communities"
Harvard Educational Review
Spring, 1969

PREFACE

One longer-range objective of The Center is a set of effective methods and tools for planning, managing and evaluating programs of vocational education. As work toward this complex objective proceeds, it becomes possible periodically to share the results of completed work on components of the larger development program. Thus, we described the emerging roles of state divisions of vocational and technical education and of their leadership personnel (Rice and Toth, 1967), described the personnel policies, practices and problems of those state divisions (Rice, 1968), developed a variety of materials for training leadership personnel (e.g., Rice and Meckley, 1970; Meckley, Valentine and McCoy, 1970; Ward and Koeninger, 1971), reported on problems and methods of manpower forecasting for state vocational education planning (Young, 1969), and presented a system for state evaluation of vocational education (Starr, 1970).

The present report continues this sequence by addressing the problem of using manpower information for vocational education planning. Following a review of the manpower and educational contexts of vocational education planning, the report examines the concept of manpower demand and some techniques for its estimation, discusses sources of manpower supply and systems for providing information about them, considers criteria for determining vocational education priorities, and describes a method for allocating resources among vocational programs.

It is expected that administrators, planners, board members, and those who prepare people for such roles in vocational education will be interested in this method for decision-making, especially because it allows considerable latitude in the selection of goals, objectives and decision strategies. However, readers should note that the model, reviewed and considered logically sound by experts in education and manpower, remains to be tested for effectiveness and value in practice. Such tests are planned in connection with programmatic work on the larger management information system under development at The Center.

We wish to thank our many colleagues from universities, state and federal agencies, and private organizations for their contributions during this project. Their number precludes individual identification here, but we would like to acknowledge the especially substantial assistance provided in critical reviews of entire drafts by Rupert N. Evans, Professor of Vocational and Technical Education, University of Illinois; Garth L. Mangum, McGraw Professor of Economics and Director of the Human Resources Institute, University of Utah; Herbert S. Parnes, Professor of Economics and

and Associate Director; and John R. Shea, Research Associate, both of the Center for Human Resource Research, The Ohio State University. Any defect remaining in this report, however, is our responsibility and is not attributable to those who attempted to assist us.

Recognition for conduct of the study and preparation of this report is due Robert C. Young, project director, William V. Clive and Benton E. Miles, research associates, and to the numerous members of The Center's technical and clerical staff who provided essential support throughout.

Robert E. Taylor
Director
The Center for Vocational
and Technical Education

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SUMMARY

1. For the efficient allocation of resources to and within vocational education, the occupational education system must be planned in the context of vocational education's comparative advantage within the human resources development system (Chapter I).

2. Adequate data do not exist for the optimal planning of vocational education, but sufficient data can be gathered, at reasonable cost, for the improvement of the allocation of vocational education resources without waiting for the development of a complete data and analysis system (Chapter I).

3. Vocational education is addressed to a diverse set of goals and objectives, and data collection relative to achievement assessment is grossly inadequate (Chapter III).

4. Unless information on local or state net employment openings by occupation is supplemented with cost and follow-up information pertaining to graduates' subsequent earnings and job satisfaction, planning vocational education programs on the basis of net local or state training related openings estimates could be grossly misleading (Chapter III).

5. Significant variations in the success of graduates from particular vocational education programs suggest that follow-up data eventually be collected on all graduates and dropouts to enable, in conjunction with input information, (1) identification of relatively successful specific programs, and (2) possible consequential modification (deletion, reduction, or curricular alterations) of those apparently less successful programs (Chapter III).

6. Because:

   a) the actual supply of trained workers that will be available to an occupation (including those trained on-the-job as well as institutionally) is partially determined by demand (Chapter II);

   b) the appraisal of future specific ("licensed practical nurse" rather than "health occupations") occupational or curricular labor market demand (particularly on sub-national and sub-state bases) is hazardous (Chapter II);

   c) a substantial portion of skill preparation is given on-the-job through apprenticeships, company training programs, and seniority systems (Chapter II);

d) appraisal of future occupational supply is fraught with difficulties (e.g., estimates of geographic mobility and the cost and magnitude of on-the-job training) (Chapter II);

e) some secondary vocational education instruction is at an introductory level (Chapter II); and

f) incomplete information is available about costs and benefits of public as well as private approaches to skill development (Chapter II);

therefore, an alternative to resource allocation through "net demand analysis" ("interfacing" or "merging" supply and demand) is suggested based on an appraisal of curricular objectives, achievement, and consequent priorities, labor market follow-up of dropouts and graduates, and the curricular interests of students. This alternate to the "net demand" approach would be more useful at the secondary school, rather than post-secondary level (training at the latter being more in-depth and the students more likely to be committed to an occupation - Chapters III and IV).

7. The matrix approach to determining curricular priorities (on the following page) is suggested for consideration when several criteria are used to evaluate curricula (Chapter IV).

8. The following resource allocation alternatives are presented (all alternatives involve the use of a curricular priority matrix similar to that above; the criteria used in the index may, however, vary with the strategy or allocation alternative involved - Chapter IV).

   a) Training Related Placement Strategy: begin with the highest priority curriculum and work down the rankings of the curricula until funds are exhausted, spending on each curriculum an amount to be determined by the following formula (Y = net annual related openings).

$$\text{MAXIMUM APPROPRIATION TO CURRICULUM X} = \left[\text{Lesser of } \left\{\begin{array}{c}\left(\begin{array}{l}\text{Number of Students in}\\ \text{Curriculum to Assure Y}\\ \text{Students Annually Seeking}\\ \text{Training Related Placement}\end{array}\right)\\ \text{----------OR----------}\\ \left(\begin{array}{l}\text{Average annual Number of}\\ \text{Students Interested in}\\ \text{Program}\end{array}\right)\end{array}\right\} \times \left[\begin{array}{l}\text{Extra}\\ \text{Curricular}\\ \text{Cost Per}\\ \text{Student}\end{array}\right]\right]$$

HYPOTHETICAL CURRICULAR PRIORITY MATRIX
(For Secondary School Programs)

CURRICULUM-OCCUPATION: / PRIORITY CRITERIA:	Net Openings	Student Interest	Academic Performance	Entry Wages	Seniority Wage	Job Satisfaction	Entry Requirements	Curricular Cost	Serving Disadvantaged (Weight = 2)	CURRICULAR PRIORITY INDEX	RANK PRIORITY ORDER
Nurse, Registered	1*	1	3	3	2	3	0	1	3x2=6	(20)**	x***
Licensed Practical Nurse	1	1	2	2	1	2	3	2	2x2=4	18	4
Nurse Aide	1	0	1	1	0	0	0	3	1x2=2	(8)	x
Typist	1	1	2	2	1	2	3	3	2x2=4	19	3
Machinist: Institutional	1	1	3	2	3	2	2	0	3x2=6	(20)	x
Machinist: Coop Ed	1	1	3	2	3	2	2	3	3x2=6	23	1
Carpenter	0	1	2	3	3	2	1	1	2x2=4	(17)	x
Computer Operator	1	1	3	3	3	3	1	1	3x2=6	22	2

*GENERAL RANKING OF CELL SCORES: 0 - inappropriate for vocational education
1 - low priority score
2 - moderate priority score
3 - high priority score

**Parentheses may be used to indicate that according to one criterion or more, the program is inappropriate for vocational education.

***Scored inappropriate for secondary vocational education under one or more criteria.

---

b) Labor Market Success Strategy: after placing heavy weights on labor market success criteria (income and job satisfaction), work down the ranked curricula, allocating resources to curricula according to the following formula:

$$\text{MAXIMUM APPROPRIATION TO CURRICULUM X} = \begin{bmatrix}\text{EXPECTED NUMBER OF INTERESTED STUDENTS}\end{bmatrix} \times \begin{bmatrix}\text{EXTRA CURRICULAR COST PER STUDENT}\end{bmatrix}$$

c) Low Cost-Maximum Coverage/Labor Market Success Strategy: (i) rank all curricula according to (with a labor market success bias) the curricular priority matrix, omitting the cost criterion; (ii) group curricula by cost (very high, high, . . . , very low); (iii) eliminate those curricula not providing some minimum degree of labor market success; (iv) fund the lowest cost curricula in order of their decreasing priority matrix rating and according to either strategy a or b above; and (v) if sufficient funds exist, gradually work up to the more expensive curricula according to the same process.

d) Moderate Cost-Moderate Coverage Strategy: select and fund programs with the highest priority ratings (according to student interest process above) within some cost constraint--say, costing no more than $200 to $500 more per student year than general or academic programs.

VOCATIONAL EDUCATION PLANNING:
MANPOWER, PRIORITIES, AND DOLLARS

CHAPTER I

INTRODUCTION

THE AMERICAN CONTEXT

Human Resource Emphasis

The world at large, and the United States in particular, is currently engaged in a vigorous program to enrich the quality of its human resources. Some have referred to this as the "Human Resources Era" (Battelle: 1) and the "Manpower Revolution" (Mangum, 1966) in describing the importance of the human capital factor.[1] The importance of this program, both in theory and in practice, has long been recognized. In the mid 1500's, for example, John Hales recognized that the critical ingredient for society's well being is the "wisdome and pollicie" [*sic*] which is "gotten chefly by learninge" [*sic*] (Hales; Kiker). The Japanese recognized human resources as critical to their Meiji Restoration in the late 1800's, and, somewhat prior to their Restoration, the

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[1]Others disagree:

> Productive wealth in the United States today is in the form of machines, structures, and land. Not "human capital" but nonhuman capital has transformed the quality of life. To it is owed those opportunities which have in fact expanded--opportunity for leisure, for education, for cultural pursuits, for travel. But at the same time, the triumph of the nonhuman factor has diminished economic opportunity as our forebears understood it (Kelso: 140).

"Manpower," as the term will be used in this report, is coterminous with "human resources" and refers to a broad range of indices and policy problems: from preschool education through higher and adult education, from institutional vocational to cooperative and on-the-job training, from labor mobility to job information, from employment to productivity, from health to minority self-help and prisoner rehabilitation. As the 1969 *Manpower Report of the President* indicated, "There is hardly any aspect of Government policy or major government program which does not have manpower implications--and often very far-reaching ones" (U.S. Department of Labor, *Manpower Report* . . . , 1969: 16).

2/3

United States recognized its responsibilities for the formation of human capital with the movement toward universal primary education between 1779 and 1865 and the establishment of the land grant university system in 1862 (Butts: Ch. 8). Today, the large proportion of society's resources flowing into human resource development in general (including such non-pedagogical fields as welfare and health) and education in particular, now increases the importance of a rational allocation of these resources.[2]

Vocational Education Planning's Complexity

Vocational education,[3] as an important component of the human resources development system, has been receiving increased intellectual and financial consideration,[4] and it is to the problem of

---

[2]It cannot be assumed that education resources are always so allocated. Christopher Jencks and David Riesman, for example: "Indeed, it could be argued that America overinvested in higher education during the pre-Jacksonian years. Perhaps the resources devoted to colleges might have been better allocated to libraries, scientific societies, or primary schooling" (Jencks and Riesman: 1-2).

The magnitude of this injection of resources into human resource development is partially reflected in the rapid increase in federal appropriations for education and health from 2.6 billion dollars in fiscal 1963 (*The Budget of the U.S., 1964*: 112 and 120) to 16.5 billion dollars in fiscal 1969 (*The Budget of the U.S., 1970*: 138 and 151)--6.6 of which in 1969 was Medicare. Education alone rose from 1.2 billion to 4.8 billion.

[3]Vocational Education will be used here to refer to those formal programs of occupational preparation or training generally reimbursed under the Vocational Education Act of 1963 and its subsequent 1968 Amendments. Such training may be either public or private (rarely is such reimbursed) and either within the school structure or, through cooperative arrangements with industry, inside the plant.

[4]One of the first of the significant federal appropriations for vocational education was the Smith-Hughes Act of 1917, which provided federal support for the training of teachers and students in agriculture, homemaking, and trade and industrial education. More recently, 1962's Manpower Development and Training Act (providing training for the unemployed often in vocational education facilities), 1963's Vocational Education Act, and 1968's amendments to the 1963 act have substantially augmented vocational education resources, with appropriations rising from 55 million dollars in fiscal 1963 (*The Budget of the U.S., 1964*: 120) to 262 million in fiscal 1969 (*The Budget of the U.S., 1970*: 138).

rational resource allocation to and within vocational education--as an important component of the larger human capital formation process--that this study is addressed. Neither the data system (e.g., programmatic cost-effectiveness information comparing cooperative education with institutional training for specific occupations in specific areas) nor the analytical techniques (e.g., a system for indisputable determination of an informed community's preferences) exists that would enable the optimal allocation of resources, but information does exist, however, that can improve the responsiveness of vocational education to changes in its context. Recognizing the process as suboptimal, this project anticipates that improved data and analytic methodology will be forthcoming to provide still further modifications in the planning system at a future date (Starr, *et al.*; Braden, Harris, and Paul; Arnold).

The context within which this planning of vocational education takes place is a complex system of mores, institutions, and practices. One of the principal constraints on the planning system, for example, is the fact that it must recognize and take account of our society's traditional preference for positive rather than negative incentives in our economic system. Given some degree of agreement that government should intervene occasionally to protect the consumer, natural resources, and society from overly aggressive short-run profit maximizers, the American people generally believe that private enterprise should be free to determine what kinds of goods will be produced, how they will be produced, and where they will be produced. One consequence of this preference is, of course, that there may be an inconsistency between the location of jobs and the residence of potential employees, which, also, has relevance for the location of the training site and the kinds of training that might be conveyed through the vocational system.

This preference for the carrot rather than the stick has extended to a belief in individual freedom in occupational competition and geographic mobility. In other words, given that manpower requirements exist for the production of a particular level and composition of economic output, our society must provide sufficient incentives to attract people into those jobs. Vocational education, as a consequence, cannot simply establish training programs and force the students into the programs. Instead, society must make the jobs and the programs sufficiently attractive that the students will choose to enter those careers of their own volition.

Another aspect of the complexity of the context within which vocational education planning takes place is the fact that the data and known relationships upon which planning decisions are normally based are derived from a given socioeconomic milieu. When one proposes major alterations in that environment, he must recognize that program results may also be altered accordingly.

As a president of the Industrial Relations Research Association warned in his presidential address:

> If economists want to be "scientific" and therefore quantitative, they are obliged to stick to a short enough run for the phenomena with which they work to stay relatively fixed--where changes are so moderate or incremental as not to invalidate logic based on a continuity of circumstance. If economists want to deal with a farther future, which increasingly involves not only change but change which is planned for, they are obliged to work with other standards than efficiency and with methods that are judgmental and strategy oriented rather than scientific. (Chamberlain: 11-12)

Examples of such non-marginal changes resulting in changes in measured program effectiveness might be a rapid expansion of the human resource development and vocational education systems, or an elimination of school dropouts. Such changes may mean sudden alterations in the costs of vocational education and the rewards to vocationally educated and trained manpower as a whole with even more substantial alterations in the costs and benefits associated with particular subdivisions (e.g., sanitation assistant) or particular training routes (e.g., apprenticeship or vocational education).

Multi-Institutional Planning

Although this is certainly not an exhaustive description of the context within which vocational education planning takes place, the final aspect discussed here is the fact that funding and decision-making for the manpower/education system takes place at many levels and in various independent agencies at the same level. At the federal level, for example, the departments of Health, Education and Welfare, Housing and Urban Development, Agriculture, Labor, Interior, and Defense are all involved in manpower development. When vocational funds come from federal, state, and local sources, as well as from relatively separate agencies at the same level, the problems of coherent planning are significantly compounded.

In addition to complications of several sources of funding and priority determination for the vocational system itself, there are extra-vocational education sources simultaneously providing youth and adults with employment related training (e.g., military, on-the-job, correspondence school, apprenticeship, Job Corps, and private training programs). A well integrated planning system would take into consideration all these extra-vocational education sources of manpower, determine the quality and cost of their skill preparation, and then compare this system with the training needs

of society to determine net training needs. This approach to planning is complicated further by the fact that our society is a dynamic one, and once a need for additional trainees is determined, it then remains to be seen which of our training sectors will expand to supply this set of skills. In other words, once net unfilled openings are determined, it cannot be assumed that the needs gap should be filled by expansion of any particular sector, such as apprenticeships or vocational education. Ideally, the skills gap would be filled by that training sector most competent in the provision of training, but the roles to be played by training sectors are determined through a mix of rationality and political log-rolling, the proportions remaining somewhat debatable.

SYSTEMS PLANNING

Given the complexity of the systems supplying and demanding skill training, it therefore, becomes imperative that if reasonably rational planning is to be undertaken, that planning must be undertaken within a systems framework. In other words, planning for vocational education cannot be done rationally without taking into consideration the rest of the manpower training and utilization system. Whether the planning technique is called a planning-programming-budgeting (PPB) system, operations research, systems analysis, or whatever, is less important than the criteria and techniques utilized in the planning process (McGivney and Nelson). The central features of such a planning system would incorporate the specification of objectives, formulation of alternative strategies for accomplishing such goals, estimation of the efficiency (in terms of the quality of output as well as inputs) of each strategy, and a feedback system to provide redirection of the operating system when dynamics or evaluative data so dictate.

A complete PPB system in vocational education is clearly infeasible at this time due to severe data inadequacies. Such a systems approach would include the following kinds of data, which are currently undeveloped or underdeveloped: (1) cost-effectiveness information concerning the efficiency of the vocational system's preparation of youth for the world of work relative to the efficiency of other skill programs such as on-the-job training; i.e., between track efficiency data (Warmbrod; Somers and Wood; Weber, Cassell and Ginsburg); (2) educational programmatic cost data; (3) knowledge concerning alternative within training track strategies for goal achievement; e.g., alternative mixes of manpower, capital, and time necessary to achieve a predetermined goal, such as the provision of skills essential for a licensed practical nurse within vocational education; (4) the amount, quality, and cost of on-the-job and institutional training currently being provided by employers, and what portion of this is dependent upon previous vocational education; (5) structure of employment by occupation and industry by state of other subnational levels;

(6) educational requirements by occupation--as opposed to educational attainment by occupation, about which something is known, but which may lead to either over- or underestimates if used as approximations for educational requirements; and (7) the manpower flows within the employment structure. Improving relevant data collection is, of course, imperative, for without it answers to such critical questions as what portion of skilled craftsmen vacancies anticipated next year due to attribution and growth may reasonably be expected to be filled through on-the-job training, upgrading, or other non-subsidized[5] nonvocational education routes will remain at best, a series of approximations or guesstimates.

In the face of imperfect, non-comprehensive planning information, this project has concluded that since planning must take place tomorrow, criteria, techniques, and data must be identified to guide planners while improved data sets are developed. The identification of that set of criteria, techniques and data is the purpose of this report.[6]

VOCATIONAL EDUCATION'S ROLE IN AMERICAN SOCIETY

Vocational education has numerous roles to play in the American culture. Not only is it expected to enhance the supply of trained manpower available to American industry, but it is also expected to operate with relative efficiency in satisfying various student needs (e.g., an interesting curriculum and an assist in the transition from school to work) as well as social needs (e.g., to alleviate the vicious circle of poverty) (Kotz: 39-40 and 183-193; Venn: 52-53; Starr, *et al.*: Appendix B). The next few paragraphs will present an overview of some of vocational education's principal objectives and achievements, which will be considered in more detail in Chapter III's discussion of planning criteria.

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[5]Rupert Evans correctly points out that: (1) the federal corporate income tax subsidizes 48 percent of employer-borne costs of training for corporations netting more than $25,000 per year, and (2) this is a far higher subsidy than the federal vocational education subsidy.

[6]David Braybrooke and Charles E. Lindbloom have written, "In short, information is extremely costly and is not always worth its cost. Hence, comprehensive analysis is not always worth its costs." See their critique of comprehensive economic, PPBS, and systems analysis in *A Strategy of Decision*.

Goals

As numerous authors have pointed out (Ginzburg: 52), a significant portion of American manpower is underutilized. Some portion of these wasted resources is reflected in the unemployment statistics, but such statistics are only a part of the story. In addition to those officially listed as unemployed, underutilized manpower includes those (1) looking for work but becoming discouraged and dropping out of the labor force; (2) working part-time but who would prefer to work full-time; (3) doing marginal work in rural areas and unaware of or unable, unwilling, or afraid to take advantage of opportunities in the urban areas; (4) mothers who would welcome the opportunity to place their children in day-care centers and take a job; (5) idle seasonal workers not looking for work because they assume they cannot get jobs in the off season; victims of (6) sex and (7) racial discrimination; and (8) mentally, (9) physically, and (10) emotionally (e.g., exconvicts) handicapped.

Given these underutilized resources, then, one basic role of vocational education is to facilitate minimization (subject, of course, to constraints such as cost) of this resource waste. In the case of the youth, this may be through the provision of saleable skills or of credentials to ease their entry into the labor market.[7] In the case of adults, vocational education aspires to provide transitory assistance to those at turning points in their careers, requiring new training to facilitate shifts from declining occupations to growth occupations, to upgrade skills to facilitate career ladder advancement, or simply to enable keeping up-to-date with technological progress.

A second goal established for vocational education, which is becoming increasingly prominent in the vocational literature, is the provision of occupational or career information to all students to enable more informed career decision-making (Parnes: 132-8). (See the discussion, "Student Interest," in Chapter III of this report.) In pursuit of this goal, vocational educators and guidance counselors are utilizing industry tours, interviews with occupational representatives, computer monitored occupational information banks with student direct access terminals (Stewart),

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[7]Edward Kalachek suggests that the increase in teenage unemployment is due to the increase in the supply of teenagers and the rise in their school enrollment. The increase in school enrollments means that dropouts become increasingly the "less physically, mentally, or emotionally qualified," and the increasing competition for part-time and part-year jobs by the teenagers and female reentrants has caused the unemployment of enrolled teenagers to rise relative to those no longer in school (Kalachek: 60-63).

and new curricula designed to expand the occupational horizons of youth prior to their vocational decision-making (Lux and Ray).

A third goal defined by vocational educators is that of stimulating interest in academic pursuits through the student's discovery of the relation between his occupational aspirations and academic curricular content. This approach to vocational education is often discussed with reference to the Nova Schools, Richmond Plan, and American Industries Project at Stout State University, all of which attempted to integrate vocational interests and skill acquisition with complementary academic courses such as English, sciences, and mathematics. Such programs are considered especially fruitful because they not only provide skills that will be directly useful to employers, but they also provide the youth with those skills, academic and nonacademic, essential for his future mobility should he be dislocated from his initial job (Advisory Council: 362-6). A corollary of this objective, then, would be that vocational education aspires to the prevention of dropouts through pedagogic programs students will consider more worthwhile than immediate, full-time, labor force entry and more relevant and worthwhile than standard academic curricula. As an economist and member of the Advisory Council on Vocational Education (1968) has expressed it:

> Increasingly, both academic and vocational education lose relevance separately. Yet the fusion of general and vocational education would not automatically create instructional content more palatable to the student. It is when the student perceives the information as meaningful in helping him to achieve sought-after goals that instructional content becomes attractive. (Mangum: 143)

A final objective of vocational education, perhaps one not often recognized by vocational educators themselves (Advisory Council: 334), is to enable fiscal policy to achieve higher levels of employment consistent with acceptable rates of inflation (Lipsey: 210-55).[8] Minimizing inflation as a goal of vocational education is based upon the usual negative relationship between rates of inflation and rates of unemployment: that is, economies generally have experienced relatively high rates of inflation when

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[8]This goal, like the first, is not a purely educational objective but makes vocational education a complement to aggregate economic policy. Thus, vocational education's goals may also include other "economic" objectives, such as economic growth and optimum resource allocation. As examples of state vocational education systems in pursuit of economic objectives, see the reports on Pennsylvania's and Oklahoma's planning and information systems (Arnold; Braden, Harris and Paul).

they have been able to reach relatively low levels of unemployment and, conversely, low rates of inflation have generally occurred during periods of high unemployment. Considering vocational education as a part of the manpower development and training system, which it clearly is in both a theoretical and administrative sense, the Department of Labor presents the rationale for its support of such manpower programs in this way:

> There are a number of ways in which manpower development and training programs ease the task of checking inflation without an appreciable rise in unemployment. By focusing on the disadvantaged, these programs concentrate upon the specific groups whose unemployment rates are the highest. By making available additional workers not otherwise employable, they help to ease tight labor markets. By training additional skilled workers, or alternatively restructuring jobs requiring skilled workers so that many of their functions can be performed by individuals of lesser skill, they help improve the relation between supply and demand in the market for particular goods and services. By improving the functioning of the job market, they cut the time between the loss of a job and the acquisition of a new one. (USDL, *Assessing . . .* 7; Chamber of Commerce: 31-2; USDL, *Manpower Reports . . .*, 1970: 8-11)

In other words, the means through which the vocational education system helps to reduce inflation is by augmenting the supply of skilled labor, this supply increase enabling firms to expand employment without the necessity of raising their wage to either draw new entrants into the labor force or bid labor away from other firms. Vocational education, then, is a means of avoiding manpower bottlenecks that augment the inflationary fires. Thus, whereas monetary and fiscal policies alone might enable the government to achieve unemployment rates of, say, four percent before unacceptable rates of inflation occur, implementation of manpower policies such as vocational education, adult retraining, and relocation subsidies might enable unemployment rates as low as three percent before unacceptable inflationary rates are experienced.

The argument for vocational education is, however, equally strong during periods of high unemployment and underemployment. During such times, their training does not (if students would otherwise be unemployed or underemployed) result in a loss of real output (due to their being in training rather than on the assembly line) as it does during more expansionary periods. The provision of skills then facilitates the later expansion, assuming their skills were used during the recovery. Thus, the argument for forecasting occupational demand and supply.

Vocational Education's Achievements

Vocational education's contribution to facilitating successful entry into the labor market appears on the surface to be quite good: the 1970 *Manpower Report of the President* reports, for example, that in October, 1968, the unemployment rate among graduates of secondary school vocational programs was seven percent, or one-half that of all June, 1968 graduates who entered the labor force (USDL, *Manpower Report . . . ,* 1970: 68). One survey of the literature on the cost-effectiveness of vocational programs concludes, "Studies that are well designed indicate . . . that vocational-technical education is a sound investment." The same author, on the other hand, indicates some ambivalence when he reports in the next paragraph that "neither adequate cost nor benefit data presently [are] available for meaningful analyses of vocational-technical education" (Warmbrod: 39).

With regard to achieving its goal of providing better occupational information to youth to facilitate their vocational decision-making, one must recognize that this goal has only recently been accepted by the vocational community and to judge it on the basis of current effectiveness (during the process of its development) would be a bit premature. What may well turn out to be two of the more effective programs, those of the Industrial Arts Curriculum Project's *World of Construction* and *World of Manufacturing* (Lux and Ray), have only recently been released to the public. One can only say that these programs offer considerable promise, the fulfillment of which remains to be seen.

Accomplishments in the area of stimulating student academic interest through the vocational curriculum are unknown, and the authors are aware of no research being conducted on the subject.

Finally, vocational education's role in minimizing inflation is still another area ripe for research. Numerous economists assume that, like all manpower programs geared to minimize structural barriers such as immobility or lack of skills, vocational education does have a role to play in the battle for lower unemployment rates with given socially acceptable inflation, but little is known about the impact of, say, 100 million dollars spent on vocational education or any other manpower program, in reducing the rate of inflation.

MANPOWER CRITERIA IN VOCATIONAL EDUCATION PLANNING

Why Manpower Criteria?

Vocational education has been criticized for its failure to respond to labor market needs, and this criticism--in addition to the recognition of vocational education's potential--eventually resulted in the 1963 Vocational Education Act specifying that

> persons of all ages in all communities . . . will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of an actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests, and ability to benefit from such training. (P.L. 88-210: Part A, Section 1)[9]

Nor was the debate stilled following the legislation (Somers).

Some vocational educators still seem ambivalent concerning the value of manpower information in their planning processes, for at a conference on the use of manpower forecasts in vocational education planning, the following comments were presented:

> State Director of Vocational Education: Although we do not need detailed occupational projections for long-range, five-year planning, we do want detailed data at the point of program establishment . . . we need not only national indicators but also local employment prospects . . .
>
> Regarding the use of manpower projections in planning, if we were simply to use the manpower projections, we should be training bricklayers in Ohio. But local political constraints dictate that we cannot train bricklayers anywhere in the state.
>
> Vocational education is already training students in those occupations with the greatest levels of demand. It is true, however, that, as vocational education trains a larger portion of the labor force, detailed forecasts will be notably more critical in the decision process.
>
> Second State Director: There are certain aspects of the vocational education process for which you don't need manpower projections: if you are introducing students to the world of work, . . . to make academic education more meaningful, why do you need manpower projections? For this you don't need manpower projections.
>
> Economist: . . . what fields of work are you going to introduce them to, if you are not going to focus on those which will be coming up when they reach the labor market 10, 15, or 20 years in the future? . . .

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[9]Underlining added. This stress on the importance of relating vocational education to gainful employment was carried over into the 1968 Amendments from the 1963 Act.

First State Director: In the last 10 years our employers have not been saying to us, just give us the well-rounded individual . . . . They are no longer willing to invest in training of people as they once were, and they will expect basically trained people in the skilled types of areas . . . . The attitude of our employers, the nature of our present unemployment, and the indications of the future nature of the jobs in the work force, would all suggest that you are going to have to plan for a prepared entrance into an occupation.

Second Economist: Well, that seems to be the strongest argument yet that has been made for planning vocational education according to manpower criteria. (Young: 165-170)

Although state vocational education plans submitted to the United States Office of Education for federal approval and funding under the 1968 Amendments must indicate that manpower criteria were taken into consideration--and all contain estimates of future employment by vocational service area[10]--the impression of one closely related observer was

> that such data do not figure in any primary way in reaching conclusions concerning the need for educational facilities, but rather serve in a secondary role as points for checking other indications of need. (Pearce)

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[10]An examination of 20 available state plans for fiscal 1970 indicated one-fifth of them used identical rates of employment increase ("Projected Labor Demand"; "Total Expansion and Replacement Needs") for all or most vocational service areas; one simply indicated whether service area employment would increase or decrease; other plans had similarly dubious demand relationships, such as relatively low growth rates in the health occupations that leads one to question their methodology. These comments are not intended as criticism of state vocational planning offices, for such data came from various sources including state employment services and universities. Rather they are a reflection of the quality of data available for such planning. The labor market information system research at the University of Michigan, for example, concludes that the detailed information needed by vocational education is one of the most glaring manpower information needs. Such data inadequacies include specific occupational and geographic breakdowns of employment trends, including both supply and demand data, as well as information on trainee characteristics related to success, appropriate demand or supply policy strategies, and the relation between hiring rates and unemployment rates (M. S. Cohen: 16-17).

Although this statement was made in 1965, the following comment from the 1968 Advisory Council *General Report* indicates that coordination of the vocational system with the labor market still leaves something to be desired:

> Activities within the States have attempted to develop appropriate relationships between vocational programs and employment needs, and there is no evidence to show that any vocational education program (with the possible exception of home economics) did not lead directly to an employment opportunity. However, the evidence does show that the major effort in vocational education has not always paralleled the greatest need in the labor force. (Advisory Council: 289)

While it is conceivable that vocational education did not meet the greatest need in the labor force because these needs were secondary to the students' own enrollment preferences, it is not obvious that this in fact accounts for the variance. This gap between the needs of the labor force--individually and in the aggregate--and the output of the vocational system is, then, the concern of this project, and this project aspires to make more explicit the means through which vocational education priority determination evolves through the meshing of the needs of the employers, students, and society.[11]

Selection of Manpower Criteria

Selection of criteria for priority determination in the educational planning process is obviously critical. Three basic techniques and sets of criteria for planning educational systems have evolved: the approaches of "social demand," "manpower requirements," and "cost-benefit" or "rate of return" (Bereday and Lauwerys: especially sections II-IV; Bowen; Hollister).

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[11] The thesis of this report is not that vocational systems have failed to consider manpower criteria, for the federal guidelines for the development of state vocational education plans in fact require that the plans give assurances that "due consideration will be given to manpower needs and job opportunities . . . and describe briefly how consideration will be given to this factor in determining allocations of funds to the various purposes . . . . " (U.S. Department of Health, Education and Welfare, "Guide for . . . ": Section 3.14) Rather than an explicit delineation of the incorporation of manpower criteria in decision-making, the plans typically state merely that they will cooperate with various agencies in considering such criteria.

The first of these approaches, the social demand criterion, bases its plans for the education system on the educational aspirations of the society. These aspirations are expressed in forecasts of the demand for educational slots based on demographic and social projections and implications for educational aspirations. The principal difficulty with using aspirations as the guide for planning is that they provide no constraints on the allocations of resources to the educational sphere, short of the enthusiasm of the population for attending school. This enthusiasm will be tempered, of course, by (1) student recognition that they sacrifice income while they attend classes (the income they would have earned if employed), and (2) student and parental knowledge of labor market trends. This social demand approach to educational planning does not, however, include any governmental resource constraints; that is, it provides no social efficiency guidelines regarding whether too much or too little has been spent on the programs. The question of whether society's benefits were worth society's costs would remain unresolved.

The second approach, that of manpower requirements, if used exclusively, would lead to structuring of the educational system so that it might best provide the human skills necessary to produce a specified composition of goods and services. This approach, then, "plans backwards" from an assumed goal of a particular set of economic output to be produced and then determines the manpower or skill structure necessary to achieve that production. While this approach does provide a limit on the amount of each type of training to be provided, it suffers from other weaknesses. For example, societies have considerable difficulty determining their final demand X years in the future, to say nothing of patterns of technological change and consequent manpower requirements for producing that set of output. Also, educational requirements for given occupations are often uncertain and often vary considerably from job to job within occupations. And, patterns of occupational mobility, say, through occupational ladders or between occupations are often unknown, so that uncertainty concerning the portion of requirements to be filled from within the current labor force leads to uncertainty concerning net requirements to be provided from the educational system. Finally, the fact that education is only one of the means through which skills are acquired--others including correspondence, apprentice, armed services, and on-the-job training--means that an optimum educational structure can only be determined after appraising vocational education's comparative advantage-vis-a-vis other training tracks. In other words, the costs and benefits of each alternative training subsystem need to be compared to determine which subsystem is best for which job. A hypothetical example, the best routes for nurses, plumbers, and sales clerks may be junior college, apprenticeship and vocational education, respectively, depending on costs and benefits of alternative programs. These problems--and others unmentioned--do not, however, invalidate the technique as a means of providing

rough outlines for the required future structure of the labor force.

The third technique, that of the cost-benefit or rate of return approach, as its name implies, is a technique for analyzing the net benefit from an investment in human resources after having taken into consideration the costs of producing those resources, alternative uses of the funds,[12] and the time lag between those programmatic costs and the benefits. The advantage of this approach is that it does provide a viewpoint from which to examine the educational system that is not provided by the other approaches to planning, that is, it provides a means of examining the price that society is paying for the benefits it received from its investments in education. The manpower approach says nothing about the cost of education, nor does the social demand approach. On the other hand, data and methodological complexities (Somers and Wood) in estimating the costs and benefits greatly hamper the analyst utilizing rate of return as his guide in planning.

As a result of these data and methodological inadequacies implicit and explicit in all of these techniques, the planning system suggested in this report will be an eclectic one, drawing insights from all of the above systems in an attempt to arrive at a suboptimal but reasonably satisfactory solution. From the social demand approach, for example, the criterion of student interest in curricula will be utilized. From the manpower approach will be drawn the criteria of job vacancies (by occupation and corresponding curriculum) and general and academic education as a source of labor supply. From the benefit-cost approach will be borrowed still other criteria, such as wages, potential vertical and geographic mobility, socioeconomic unemployment rates, curricular programmatic costs, job satisfaction, etc. Suggestions then will be made concerning the integration of these criteria into a decision-making model.

OVERVIEW OF THIS REPORT

This report will examine various segments of the vocational planning and implementation problem. (1) The sources and utility

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[12] The potential alternative use of the funds would be the "real cost" of the program--that is, the cost of using the funds in vocational education would be the academic, MDTA, transportation, or other program sacrificed in the decision to use the funds for vocational education. Careful cost-benefit and PPBS analysis must consider such problems so that benefits from the educational programs are net of benefits foregone by failure to use the funds to support other programs.

of demand forecasting information will be examined. (2) The non-vocational supply of trained manpower and its relation to the vocational system will be considered. (3) Alternative criteria for evaluating vocational education programs will be investigated, along with relevant data sources. (4) A means for integrating several criteria into one decision index for determining vocational education curricular priorities is then suggested. (5) Finally, alternative resource allocation strategies will be presented.

CHAPTER II

SUPPLY OF AND DEMAND FOR MANPOWER

INTRODUCTION

Since, (1) vocational education is by definition education for employment, and (2) the 1963 and 1968 vocational education legislation indicate that such training must be "realistic in the light of actual or anticipated opportunities for gainful employment," therefore, it is only reasonable that estimates concerning the future supply of and demand for skilled manpower be incorporated in the vocational education planning process.

> Since manpower planning is based on the application of foresight, the first step in any planning program is the development of research so as to improve the forecasting, by skill categories, of demand and supply for the nation and for particular industries and areas over, say, the next decade. Such projections can be in terms of rough magnitudes and relative changes or trends. It is, however, desirable to make quite explicit the assumptions on which the projections rest, for purposes of their later revision and of improvement in the methods of manpower forecasting. (Lester: 6-7)

The fact that vocational education planning is not to be conducted according to employment criteria alone does not eliminate the utility of such forecasts. The forecasts simply become part of a more comprehensive set of criteria rather than the sole determining factors for the plans.

Demand, Supply, and Wages

In the study of the supply of and demand for manpower, one must remember that the number of workers that will be supplied or demanded in a given occupation at a given time depends not only on the level of demand for the output to be produced by those workers but also on the going wage for that occupation (in addition, of course, to other factors such as the technological possibilities for substituting capital for labor). In other words, to somewhat simplify the case, demand for and supply of labor have two principal components: the wages earned by a particular

occupational group and the number of workers demanded and supplied at those wages.

The wages paid dishwashers, for example, are generally very low, say $1.50-$2.00 per hour. There are also a large number of additional job vacancies for dishwashers, that is, a large number of dishwashers demanded at that wage. These vacancies represent, it should be clear, only the unfilled portion of the demand for dishwashers. While there are a large number of such openings, there are relatively few people willing to be dishwashers at those wages. Some people thus refer to this situation as a "demand occupation" or an occupation with "excess demand." Students of the labor market, however, would refer to this situation as one in which the relatively low wages offered for these positions account for the difference between the quantity of workers supplied to and demanded for the vacancies. A relatively low level of demand for personnel to fill these vacancies, then--in terms of willingness to pay attractive wages--accounts for the continued existence of such vacancies while, simultaneously, substantial numbers remain unemployed. The vacancies, then, may represent offers by employers who are unwilling to pay wages sufficiently high to "clear the market" at a higher level of employment than is currently true. If wages for given levels of employment were significantly raised, the labor market analyst would point out, the supply of personnel willing to work would normally increase, perhaps resulting in a decrease in vacancies without any increase in training. This is particularly true in the case of unskilled occupations, where rigidities in the training system, or other barriers to entry, do not account for the gap between the quantities supplied and demanded.

The point is, then, that simply because there may appear to be a shortage in supply of personnel in a particular occupation does not necessarily mean that one must therefore set up more training stations for that occupation. In the case of nurse aides, for example, the appropriate remedy for their shortage may not be provision of more vocational education training stations (hospitals will often train them on-the-job) but rather simply an increase in their wages. Relatively low levels of incentives, including wages, for some occupations is very likely also responsible for the fact that numerous vocational programs are notably under-enrolled. In the words of an economist who has worked closely with the vocational community:

> The objective of vocational education should be the development of the individual, not the needs of the labor market. One of the functions of an economic system is to structure incentives in such a way that individuals will freely choose to accomplish the tasks which need to be done. (Mangum, 1968: 49)

If the economic system does not provide incentives sufficiently attractive to draw students into particular programs, there seems little reason to establish such programs. All this assumes, of course, that students are knowledgeable about the occupation's incentives.

Forecasts of supply and demand, then, are simply the first step in the planning process. One must then examine other relevant considerations--such as wages, student interests, other training sources, and job satisfaction--before determining appropriateness of a curricular program.

The discussion in this chapter, however, will consider "demand" simply in the sense of the number of gross employment opportunities in an occupation or set of occupations, the estimates being based on the assumption that wages, and incentives generally, in the occupation will remain constant relative to wages and incentives in other occupations. In other words, if the average wage in the economy increases by 25 percent during the period under consideration, the occupation examined will also be assumed to have had a 25 percent wage increase. When "supply" is discussed, it too, in this chapter, will be used not in the sense of a curve or functional relationship between wages and employment but rather simply as the number willing and able to work in a given occupation at a given relative wage. Wages and their role in demand, supply, and vocational education planning will then be further discussed in subsequent chapters.

Forecasting's Utility in Educational Planning

Opinion that forecasting makes a net positive contribution to educational planning is not universal. Doubt concerning this contribution arises, first, from the fact that forecasts often are disappointingly inaccurate and, second, from the fact that these inaccurate forecasts may then result in misallocated resources.

One economist, a student of educational planning, has commented on the accuracy of forecasts:

> . . . the period over which we can usefully forecast the demand for manpower in the present state of knowledge is much more limited than is usually admitted. All the evidence shows that we do not yet know how to forecast beyond three or four years with anything remotely resembling the 10 percent margin of errors that are regarded as just tolerable in general economic forecasting. (Blaug: 279; Norton)

After pointing to evidence indicating the empirical variation between forecasts and reality, he goes on to indicate that even if

perfectly accurate forecasting were possible the occupational and educational decisions of students would still be filled with uncertainty. To estimate his probable occupational success, the student would not only have to know occupational demand in the future, but he still would have to estimate the way other students and planners will respond to those forecasted demands.

Another economist after indicating that negative net benefits may arise from manpower projections as a result of either wrong projections or overreaction to accurate projection--points to the basic weakness in the argument that such projections are better than "sheer speculation" for educational planning purposes: the basic weakness of this argument is that those doing the planning do have considerable information at their disposal and are not basing their decision-making on sheer speculation but rather the accumulated wisdom acquired through years of responsibility (W. L. Hansen: 11). A "vocal group of conferees" at the conference on occupational data requirements for educational planning "asserted that the prodigal inaccuracy of occupational forecasts would lead to inconclusive and perhaps dangerous results. Users of such projections, unaware of the weaknesses in the methodological approach to such studies, would be misled into projecting unrealistic plans in the training and education field" (March: 11).

A representative of the United States Department of Labor, on the other hand, has defended the role of the manpower projector:

> I cannot envision that a very large percent of decision-makers or other users are likely to make implicitly projections that are more carefully thought out or consistent than those being developed and published. Certainly not the counselors in schools, or the program planners at the Job Corps, or the officials of most individual companies, or even those persons who might find helpful an appraisal of the adequacy of present and perspective [*sic*] supply of manpower in developing policy by government and industry with respect to such matters as recruitment, development of supporting workers, scholarships, expansion of research programs, etc. (Swerdloff, 1966: 26; Swerdloff, 1969).

Recognizing, then, that forecasts of supply and demand fall short of preferred accuracy levels, but operating on the assumptions that (1) the use of explicit expert forecasts is better than use of implicit amateur forecasts, and (2) experience with forecasting and relevant data generation will improve the quality of forecasts, this report represents an attempt to "leave the comfort and solace of aggregated, national data and move into the muck and mire of disaggregated local labor market data" (Jencks, 1966: 22). Such disaggregated forecasts--assuming they are workably accurate and not responsible for student or planning overreaction--are the ones

most meaningful for vocational education planning and guidance purposes.

In some respects, the need for accuracy in forecasts for vocational education planning is minimized by the relatively low levels of enrollment in vocational education.[1] When vocational education supplies only a very small portion of the trained labor force, the importance of highly accurate manpower forecasts is minimized: if there is a total demand for 2,000 programmers in Chicago in 1975, but the forecasted demand is 1,000 programmers, little harm is done if vocational education only has resources to supply 50 programmers. However, if vocational education had the resources to supply 2000 programmers and failed to do so because of inaccurate forecasts, the repercussions of inadequate forecasting become more significant. Therefore, if a significant expansion of the vocational education system--in the form of specific rather than generalized skill training programs--is in the offing in the near future, development and refinement of an acceptable forecasting system, or systems, becomes increasingly appropriate.

TYPES OF MANPOWER FORECASTS

Numerous types of manpower forecasts exist, and these may be classified according to either the nature of the variable forecast or the technique utilized to forecast the given variable. Among the types of variables forecast are the following (W. L. Hansen: 12-13):

1) Requirements: given assumptions and expectations about output, productivity, substitution, mobility, etc., this would yield an estimate of the requirements necessary to produce that output.

2) Availables: this would be an estimate of anticipated manpower on hand, given assumptions and expectations about attrition, flows of newly trained manpower, including the magnitude and composition of output.

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[1]Reports of the numbers and percentages of vocational education students vary depending upon the source. The National Advisory Council reported in 1968 that 25 percent of secondary school students are served by vocational education, but a sizeable portion of this was in home economics (Advisory Council: 260). At the local level, for example, Walter Arnold reports that vocational education's contribution to meeting Philadelphia's labor force demands "was not very substantial" (Arnold: 409-10).

3) Outcomes: such a forecast would yield estimates of shortages or surpluses resulting from the interplay between requirements and availables.

4) Outcomes with responses: such a forecast would yield an estimate of outcomes (as in "3") with labor market reactions to knowledge of that projected outcome, the reactions conceivably taking place in either the requirements (through factor substitution) or availables (through alterations in labor supply).

5) Actuals: an estimate of actual employment after both *ex ante* (as in "4") and *ex post* adjustments have taken place, within the constraints of the assumptions.

Given, then, that there are various manpower concepts that may be forecast, there are also various means through which each estimate may be generated, some of the methods being more appropriate for some concepts (e.g., requirements and actuals) than others (availables). Depending on how precise one wants to be in his methodological delineations, there are four or more techniques that may be utilized for manpower forecasting:

1) Employer surveys,

2) Extrapolation of trends,

3) Econometric techniques, and

4) Job Vacancy--Occupational outlook approach.

Various other combinations of the above techniques are possible, have been utilized, and are ably discussed by Mehmet.

Employer Surveys

The two principal types of local employer surveys historically used to sound the supply of and demand for skilled manpower are the "Area Skills Survey" and the "Training Needs Survey," the latter being simply a watered-down version of the former. In the area skills survey, 50 to 150 occupations--with relatively high levels of employment--are examined concerning their supplies and demands. The occupations often require at least a year's training at less than the bachelor's degree level, including those in the skilled, semiskilled, semiprofessional, technical, clerical, and service occupation groups. A scientific sample of employers is asked to provide estimates of employment currently, two years hence, and five years from now. Estimates of annual replacement and on-the-job training are also collected. In addition to the collection of on-the-job training estimates from employers, as

indicated above, the supply estimates are supplemented with information gathered from public and private schools and training institutions, including MDTA, apprenticeship, business school, and trade union programs. Local employment service unemployment data are also utilized. Comparison of supply and demand estimates then yields the estimates of training needs, on an internal basis, for that area. When the training needs survey is utilized, the area skill technique is simplified in that fewer occupations are examined, the forecast period is only one or two years, and the employers surveyed are fewer in number and nonrandomly selected (Chavrid: 68-9; Mehmet: 29-33).

The area skills survey and, thus, its less sophisticated cousin, the training needs survey, however, do have a number of problems (Kaufman, 1969: 7-27; Doeringer; Burt; Swerdloff, 1965; Levitan: 134; USDL, 1967: 44; Wisconsin, 1970 and 1970; Weber, et al.: 18; Somers, 1968). First of all employers are criticized for being a relatively unreliable source of training needs information. Relatively few firms do manpower planning, and when reports on such skill needs are prepared, they are often developed by those without knowledge of the company's prospects. To surmount fear by employers in one area that information on future skill needs would be acquired and used against them by competitors, the skill survey was contracted out to a private organization, so that the employers would have recourse to suit in case of breach of confidence. Labor mobility into and out of areas complicate these problems of purely localized forecasting of supply and demand. In Oklahoma, for example, one-fifth to one-third of those available for placement following vocational education migrate out-of-state for their employment (Braden, Harris, and Paul: 25). The impossibility of including in such a survey firms not yet located in the area is still another source of difficulty. As a result of these problems, the Advisory Committee on Research to the U.S. Employment Service has recommended that the " . . . present Area Skill Survey program should be phased out" (Weber, 1968: 18; Payne; Hollister, 1965: 59-60; Fishman: 51).

A test of the forecasting accuracy of the area skill survey was conducted in two cities in Virginia. The result of this test was that, compared to the area skill survey, a forecast based on an assumed increase in occupational employment equal to the average state employment increase yielded, in one city, only a very slight decrease in accuracy (one percent). In the other city, the naive growth model was more accurate than the area skill survey (Moser: 182-3).

The frequent resort of vocational educators to some kind of area skill survey (Somers, 1968: 56)--although not always according to the tight definition above--reflects the fact that, particularly the less expensive of the two cousins, the training needs survey does have some advantages (Levitan; Swerdloff, 1965:

16; Chavrid: 68-9). Central to their widespread use, employer surveys of the less expensive variety have the advantages that they are easy to administer, low cost, and may provide estimates of requirements for many occupations relatively quickly. They take account of each company's immediate plans for expansion, innovation, or production process alteration, and they place the primary responsibility for the quality of the data on the respondents. Levitan argues accordingly:

> It is not at all clear, however, that the technical shortcomings of Area Skill Surveys present serious impediments to formulators of educational policy. Knowledge of general trends should be adequate to plan for the expansion of needed facilities and programs and retrenchment in others. The details as to specific courses can be implemented on a case-by-case basis and should normally require a short lead time. The fact that area skill projections have no way of taking into account the demand of new employers starting after a survey is completed should not constitute a serious obstacle to educational planning. It might be taken for granted that any new major employer in an area would consult with school authorities or the public employment service about his anticipated skill needs, or that the news would become sufficiently widespread within the community and available to the school authorities, even if a prospective major employer failed to advise the school authorities of his plans. The school authorities could then revise their planning in line with the new developments. However, in practice, it would appear the lines of communication between employers and educators frequently break down and that schools are not always responsive to the needs of employers.

Thus, while such surveys may not provide the best of all possible data, it is easy to see why they are frequently utilized. [The discussion below, on econometric techniques, discusses the U.S. Department of Labor's new occupational employment survey and its relation to econometric techniques.]

Extrapolation

The second forecasting technique, that of trend extrapolation, estimates future employment on the basis of the assumption that trends in the future will be similar to trends in the past. This technique too has the virtues of speed, efficiency, and economy, but the farther one projects into the future, the less likely the assumption is to hold. One of the basic reasons that we have manpower problems is that the past has not served as a sufficient indicator for human resource development policies. In some cases,

however, trend extrapolation has been found to be at least as accurate as "more sophisticated" (i.e., more expensive) techniques (Hartle: 105; Howard Brown: 107, 149; Mehmet: 22-26), and more work is needed to discern when these simplistic methods are appropriate and when a greater appropriation of funds is warranted.

Econometric Techniques

Probably the most sophisticated manpower forecasting research program in the world is that of the Bureau of Labor Statistics of the U.S. Department of Labor (Goldstein, 1969; USDL, *Tomorrow's Manpower Needs*: Vols. I-IV). Results of this program are 10 year forecasts of requirements, sometimes classified by specific U.S. Office of Education Instructional Program Title (USDL, *Manpower Requirements*), useful for education and training program planning. The 10 year forecast is provided to enable adequate time for training the individual as well as planning, constructing, and staffing programs.

Briefly, the steps taken in generating the B.L.S. forecasts are as follows:

1) Projection of the population by age, sex, color, and geographical distribution.

2) Projection of the labor force, by age, sex, color, educational level, and state.

3) Based on the assumption of minimal unemployment, an estimate is then made concerning future levels of gross national product, based on trends in productivity, hours of work, and consumer expenditures.

4) These estimates of final demand are then examined for their implications in terms of industrial output at both the final stage of production as well as among the intermediate and basic industries which provide the inputs to the final production process.

5) Given the final output expected from the various industrial sectors, estimates are then made of the manpower or occupational structure within each industry required to produce that output.

6) These estimates of occupational employment by industry, based on the industry/occupational matrix or the B.L.S. matrix, may then be summed to provide the total estimated employment by occupation.

7) In addition to changes in requirements as a result of growth or decline in occupational employment, estimates are made of those leaving the work force through withdrawal, death, and retirement. These two components of future occupational need-growth and occupational losses are then summed to provide the estimate of new openings for labor force entrants. Net interoccupational mobility is allowed for only roughly, due to the inadequacies of empirical data.[2]

The above technique, then, provides estimates of new openings by occupation, but for these estimates to be useful in planning vocational education, one must add the additional step of converting occupational categories into instructional categories required for that occupation. The Department of Labor has already begun providing such estimates on a national basis (USDL, *Manpower Requirements*; USDL, BLS, *Occupational Manpower*), which may begin to serve as an aggregative check on the total output of vocational product for the country as a whole.

The B.L.S. matrix approach to manpower requirements forecasting is not without its weaknesses (Hollister, 1967: 29-38; Duncan: 28-29). One of the problems in such forecasting is that of accurately forecasting the level of economic activity, both in the aggregate and by sector. The willingness of the legislative and executive branches to maintain full employment in the face of inflation, say, and uncertain shifts from a war economy to peacetime economy, or vice versa, typify some of the problems in realizing expectations. A second problem encountered in the occupation/industry matrix approach to forecasting is that of appraising the rate of technological change in the economy as a whole as derived from sectoral estimates of such change. Technological change is an important component of a third problem: estimating productivity trends, or the labor input coefficients for given levels of sectoral output.[3] In addition to anticipating the rate

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[2]Hollister has described the technique utilized by the Organization for Economic Cooperation and Development's Mediterranean Regional Project (1967: 26-7).

Utah's Department of Employment Security has forecast employment by detailed *Dictionary of Occupational Titles* code up to 1975, utilizing their own industry/occupation matrix generated through surveys of employers. Their estimate of industry employment is derived from regression analyses of such trends combined with "professional knowledge" (Richard Brown).

[3]Michael J. Piore reminds the analyst that productivity is correlated not only with technological change but also the level of aggregate economic activity, levels of productivity being

of technological change for industrial sectors one must--to determine these labor coefficients--also anticipate the effect that the supply of labor will have on the quantity of labor actually utilized, an effect sometimes referred to as the "substitution effect," the substitution of labor for capital inputs as a function of the relative availability and productivity of each. A fourth problem in forecasting manpower requirements is that of estimating the educational requirements for given occupations. This problem, which is, unfortunately, not peculiar to the matrix approach, is one of the most serious, and concerns the relationship between the kinds of education that are actually required for adequate performance in given occupations. One cannot assume, for example, that simply because the average employee in a given occupational cluster has a bachelor's degree that therefore the bachelor's degree is the optimum level of education for any job in that cluster: it may be either too much or too little education, depending on the general nature of the job itself, kinds of individuals attracted into that occupation, the content of different baccalaureates, the availability of associate and master's degree programs, and the homogeneity of jobs which constitute that occupational group. More will be said about this in subsequent sections of the report.

Whereas the Advisory Committee on Research to the U.S. Employment Service recommended the phasing out of the area skill survey, the committee recommended the econometric approach be utilized to provide vocational education planners with their manpower data:

> To replace the Area Skill Survey program, the BLS occupation-industry matrix appears to be a promising method for developing forecasts of labor demand at the level of the

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[5]directly related to unemployment during the late 1950's and early 1960's. The process of on-the-job training tends to reduce productivity by increasing costs, so that an increase in productivity may reflect a reduction in the adjustment required by the labor force (Piore).

The reason for the reduction in the adjustment required by the labor force, however, is simply that it was not being fully utilized, and a more complete utilization of human resources at that time would undoubtedly have required greater adjustment: more on-the-job training and thus less productivity. Thus, while deficient aggregate demand may have accounted for the gross underutilization of labor, it is also very likely true that a less than optimal skill structure, which may have required on-the-job training by firms ill equipped to do so, may have kept employment below what it otherwise might have been.

> state or labor market area. The application of the matrix approach to the forecasting requirement of the Employment Service should be seriously explored. Reasonably accurate supply data probably can be developed at the state or local level from population data, school enrollment figures, training institutions, and the employers. The longer-term forecasts should be made every two to three years. These estimates could be useful in planning vocational education curricula and facilities. In this respect, a survey of vocational education administrators conducted for the Committee indicated that there was an approximately two-year cycle in the planning of vocational education curricula and a six-year cycle in the development of new facilities. (Weber, *et al.*: 18)[4]

In line with these recommendations, the U.S. Department of Labor's Bureau of Labor Statistics is combining its industry-occupation matrix research with its new Occupational Employment Survey so that in the near future it will be able to provide, for cooperating states, occupational forecasts and estimates of state and sub-state occupational employment (Goldstein, 1971). The U.S. Training and Employment Service is already able to provide, as a consequence of the BLS matrix research, occupational forecasts for states based on national trends.

Given occupational forecasts, the present volume suggests techniques for combining these and other manpower and non-manpower criteria in the decision-making process. The following section discusses a set of complementary, relatively low cost, local area specific manpower data that reflect (with uncertain accuracy) supply and demand conditions for specific occupations that some vocational educators feel meet their particular needs.

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[4]The Oklahoma Occupational Training Information System (OTIS) decided not to use matrix derived projections because they felt it important to develop a close working relationship between schools and industry, and consequently they collected employer self-forecast type data through the intermediary of the school's industrial training coordinators (one who coordinates work experience on-the-job with the student's simultaneous in-school program). The OTIS staff argued this facilitates placement and close coordination of the training program needs of industry. They also believe that such surveys are appropriate in states with small populations whereas they might not be appropriate in larger states, in which surveys might be impossible. Clearly, it would be helpful if such surveys were compared to the matrix approach's accuracy and general cost-effectiveness, both within and between states of varying sizes (Braden, Harris, and Paul: 38-9).

Job Vacancy-Occupational Outlook Approach

One student of the problem of manpower information for vocational education raises the following question:

> what does it mean (if an estimated need in an occupation is 500) when the true need is 250 or 750 (assuming it were possible to ascertain the figure) and when there are only physical facilities or funds for two classes of 25 each? Why the heavy emphasis on an elaborate econometric model when either before the study takes place or after it is completed, the economist programs a major correction factor based on judgement or other nonquantitative data? (Medvin, "Forecasting . . . ": 412; also, Medvin, "Occupational . . . ," 1967; Medvin, 1969; National Bureau)

When high degrees of accuracy in forecasting employment for vocational education planning are unnecessary, due to the shortfall of resources necessary to meet the forecast needs, Medvin has proposed that unfilled job vacancy information (from state employment services)[5] be combined with the occupational trend information in the *Occupational Outlook Handbook* (USDL, *Occupational Outlook*) to provide the detailed general trend information, classified by specific *Dictionary of Occupational Titles* (USDL, *Dictionary . . .*) codes, which have been converted elsewhere into U.S. Office of Education instructional codes (USDHEW and USDL).

The proposed method, also known as the job vacancy/matrix approach, because it utilizes inputs from the BLS matrix analysis, examines employment service listings of job openings unfilled for 30 days or more, compares them to the total number of such openings (recent and unfilled 30 days or more), and then considers the relationship between such data over time, which would reflect the persistence of a significant portion of unfilled openings. Using the number of hard to fill openings as the criterion, a

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[5]Job vacancy information in some areas exists in two forms, from the job vacancy survey of sampled establishments, and from the administrative records of the state employment security agency (which actually compiles both kinds of reports). The latter, but not the former, includes all sectors of the nonagricultural economy and jobs not immediately available for filling (USDL, "News," July 30, 1970). For an example of a state report with anticipated openings listed by D.O.T. code, minimum education and training requirements, and possibilities for promotion, see *VTAE District 18 Occupational Needs Survey* (Wisconsin, Department of Industry, . . . ; also, N.Y. State Department of Labor, "Unfilled Openings . . . "; Norton).

listing, in descending order, is constructed indicating jobs with the most apparent shortages. National employment trends, as reflected in the *Occupational Outlook Handbook* or the BLS matrix output, are indicated in the same table to provide context information as a supplement to the local data. Thus, tables such as that on the following page provide information that should be useful in the selection of training programs.

As reflected in the table, information on reasons for difficulty in filling the jobs is also supplied, such as, (1) shortages of qualified workers, (2) low wages--relative to other jobs in the area, (3) working conditions, and (4) other, so that one has some feeling concerning whether the shortages are due to the inelasticity of the training system--non-responsiveness of the training system to increased opportunities for its graduates--or the reluctance of qualified personnel to enter such positions.

Such a data system for determining training priorities has several advantages. First, employment forecasts provide a spurious sense of accuracy and have considerable difficulty incorporating supply considerations. The openings-matrix approach, however, has built into it the flow of supply: if there are no hard to fill openings on file, if the occupation is one with high penetration into employment service files, the assumption is that either through mobility or training, the needs are somehow being met. Second, the system is relatively inexpensive: as opposed to area skill surveys, which may cost from $20,000 to $100,000, depending on the size of the city and the scope of the survey, the openings-matrix approach would cost less than $2,000 for a city the size of New York. Finally, the school systems believe that the information is useful, being relatively job and instructional code specific and related to the local areas.

Openings-matrix determination of training needs is not, however, without its flaws (Dunlop; Somers, 1968; Myron). First, a distinction must be made between jobs providing a permanent opportunity for employment and advancement and those jobs providing only temporary employment: the job vacancy statistics appear to be biased in favor of the latter. Second, hiring standards for entry jobs may be higher than actually required on the entry job because of the promotional ladders within the firm. Consequently to train only for those jobs reflected in the vacancy statistics would be to impede internal labor market promotion. Third, there may be bottleneck--or relatively critical--vacancies, the filling of which would enable the employment of still more complementary staff. Fourth, redundant vacancies may exist, so that when one employer acquires an employee of given talents it will enable that employer to move into a market and eliminate the vacancy filled by another employer. This would be the case where employers compete for the same, say construction or defense contract. In other words, the sum of job vacancies is not necessarily equal to the

MILWAUKEE (SELECTED OCCUPATIONS)

OCCUPATIONAL TITLE	D.O.T. CODE	VOCATIONAL TECH., SCHOOL CLASS	JOB-FILLED OPENINGS	# HRS TO FILL	GROWTH RATE TO 75 (25)	S E X	L E V	WAGE AND/OR REASON FOR HARD-TO-FILL	
								HI/WAGE	OTHER REASONS
BLACKSMITH	517.678 010	HOME ECON	11-20	40-59	MODERATE	5	2		
COMPOSITOR	979.878 014		6-10	40-59	MODERATE	5	2		
DIE SET	711.878 010	TRADE & IND	11-20	60-100	RAPID	2	2		WAGES TOO LOW TO ATTRACT
MACHINE INSPECTOR	711.878 058	TRADE & IND	50 +	40-79	RAPID	5	5	UP TO 1.50	POTENTIAL APPLICANTS
SHIPTENDER	912.878 014		2-5	40-79	RAPID	5	5		
COOK	315.381 018	TRADE & IND	6-10	1-39	RAPID	4	1	2.50-2.99	WAGES TOO LOW TO ATTRACT
COOK SHORT ORDER	314.381 010	TRADE & IND	11-20	60-79	RAPID	4	4		POTENTIAL APPLICANTS
COOK	315.381 010	TRADE & IND	2-5	1-39	RAPID	1	1		
PANTRYMAN	317.884 014		6-10	40-59	RAPID	5	5		
KITCHEN HELPER	318.887 010		21-50	1-39	RAPID	1	2		
HOUSEMAN	323.887 010		2-5	40-59	RAPID	2	3		
MAID	323.887 014	HOME ECON	11-20	60-79	RAPID	2	2		
CHAMBERMAID	552.271 010	TRADE & IND	6-10	80-100	RAPID	4	4		
NURSE AID	355.878 034	HEALTH OCC.	51-50	60-79	RAPID	5	4	2.00-2.99	
PHOTOFINISHING MACHINE	143.782 018	TRADE & IND	6-10	60-79	MODERATE	5	4		
CLERK	272.868 030		11-20	60-79	N. A.	2	3		
CASHIER	211.887 014	TRADE & IND	6-10	1-39	DECLINE	2	2		
TYPIST	201.887 030	TRADE & IND	11-20	40-59	DECLINE	2	2		
DRAFTER	982.884 018	TRADE & IND	6-10	1-39	DECLINE	3	3		
MACHINE CLERGER	389.887 034		2-5	40-59	MODERATE	2	2		
MACHINISTS									
MILLER	514.381 022	TRADE & IND	11-20	80-100	SLOW	4	3		ELIMINATED OR NO TRAINING OPPORTUNITIES FOR THIS OCCUPATION
MACHINE MILLER	514.782 010		11-20	80-100	SLOW	5	4	3.00-3.49	
TOOLROOM WORKER GENERAL	514.887 022	TRADE & IND	51-150	60-79	SLOW	1	2	3.00-3.49	UNATTRACTIVE JOB IMAGE
GRINDER WORKER	520.886 010		2-5	1	N. A.	2	2		HIGHER WORKING CONDITIONS
TOOL MILLER	553.885 042		2-5	80-100	N. A.	2	2		
LABORER GENERAL	869.884 022		6-10	60-79	SLOW	2	2		
MACHINE TOOLS									
MACHINIST	600.280 030	TRADE & IND	11-20	60-79	MODERATE	4	3		LENGTH OF TRAINING DISCOURAGES POTENTIAL TRAINEES
MACHINIST APPRENTICE	600.280 034	TRADE & IND	2-5	80-100	MODERATE	4	3		
MACHINEMAN MACHINIST	600.280 054	TRADE & IND	2-5	60-79	MODERATE	4	3		
JOB SETTER	600.280 022	TRADE & IND	2-5	60-79	MODERATE	4	4		
MACHINE SET-UP OPERATOR	600.380 026	TRADE & IND	6-10	60-79	MODERATE	4	4		LENGTH OF TRAINING DISCOURAGES POTENTIAL TRAINEES
TOOL-MACHINE SET-UP	601.280 042	TRADE & IND	11-20	80-100	MODERATE	4	3		
TOOL-MACHINE SET-UP OPERATOR	601.280 070	TRADE & IND	2-5	60-100	MODERATE	4	3		
LEAD-SET-UP-MACHINE SET-UP OPERATOR	602.380 010	TRADE & IND	2-5	60-79	MODERATE	4	4		
LEAD HOBBER SET-UP OPERATOR	602.782 010	TRADE & IND	2-5	60-100	MODERATE	5	5		
OPERATOR OPERATOR EXTERNAL TOOL	605.280 010	TRADE & IND	2-5	80-100	MODERATE	4	3		
OPERATOR OPERATOR INTERNAL TOOL	605.280 014		2-5	60-79	MODERATE	4	3		

Source: Wisconsin State Employment Service, *Occupational Opportunities Information for Wisconsin* (Madison: Department of Industry, Labor and Human Relations, June, 1970), p. 37.

sum of people that could be employed. Fifth, when the number of vacancies is due to the relatively low level of wages offered, to use the vacancy data as an index for training priority would tend to maintain relatively low wages through the provision of an expanded labor supply. It must be recognized, however, that all training tends to increase labor supply and thus suppress wages. Sixth, as Fiore has indicated, reported job vacancies may reflect not only the demand for a particular quality of skilled labor but also the fact that on-the-job training is taking place to alleviate the shortfall in supply. This "healthy adjustment process" may eventually relieve the underlying shortage without the establishment of formal instructional programs (Fiore: 887). Finally, penetration of the employment service files by employers and occupations is very uneven, occupational penetration being biased toward the below bachelor's degree end of the educational continuum and employer penetration toward the nonunion employers.

Since vocational educators are compelled to approve, initiate, expand and/or terminate training programs and require information on which to base such decisions, it seems unlikely that the provision of such relatively inexpensive data, used in conjunction with other manpower and planning criteria, would weaken their decision-making. Certainly the job vacancy data system must be appraised, but there seems little reason to believe that it is inherently inferior to some of the relatively standard sources currently utilized, such as other labor market data coming from the employment services and suggestions from employers, students, and unions.

SUPPLY ANALYSIS

Problem

Planning labor force skill supplementation, through vocational education or any other human resource development program, requires that one appraise the quality and quantity of the current and potential supply of skills. Consideration of demand is useless for policy purposes without some implicit or explicit assumptions about supply. Given anticipated demand in a particular occupation at a given moment in time, to determine optimal training needs for the vocational education system, one must appraise the likely or desired output from other sources of such training, and subtract that from gross demand to determine the optimal net demand to be fulfilled by the vocational system.

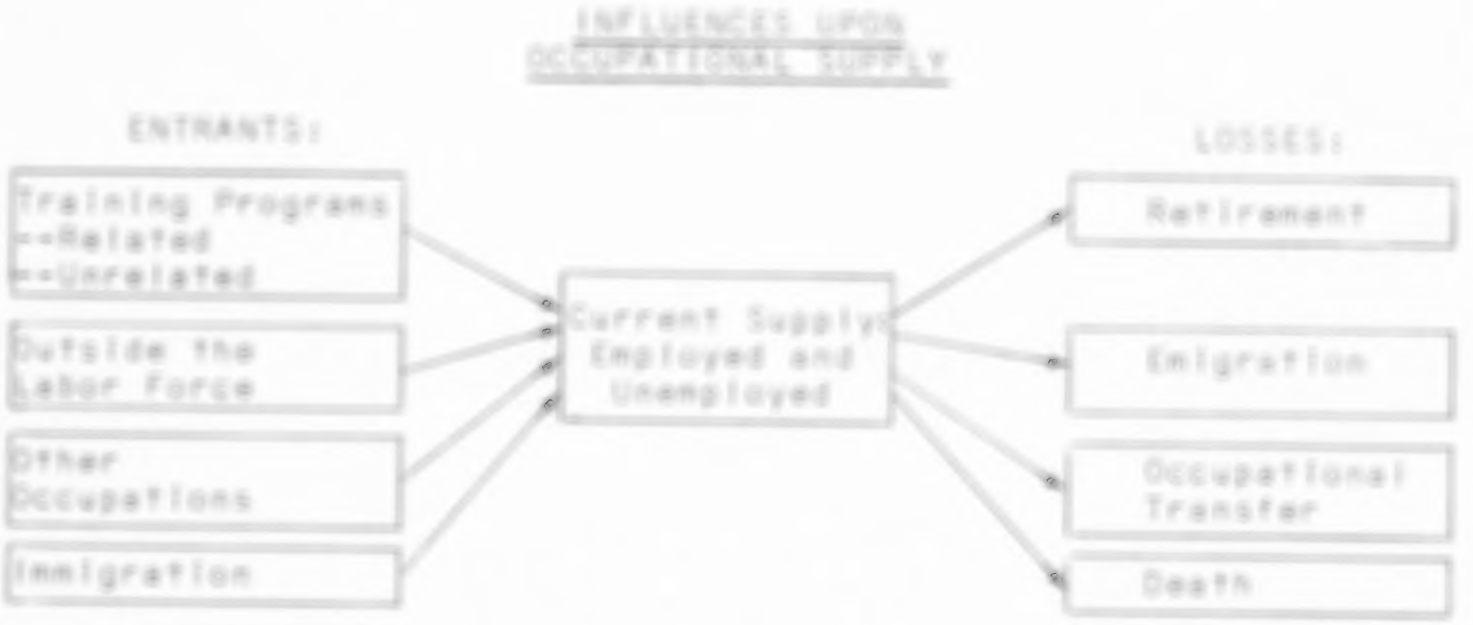
Unfortunately, information concerning current, much less anticipated or desirable, manpower supplies falls far short of that necessary to enable determination of an optimal net output of vocational education's product. To enable a calculation of that optimal net output one would require not only data concerning

actual flows and stocks of such manpower but also the cost-effectiveness and potential of various training alternatives. In addition to knowing current employment (by specific occupation), withdrawal rates, extent of on-the-job training, and inter-occupational mobility, the public vocational and human resources planner must concern himself with the cost-effectiveness and potential of vocational education as opposed to MDTA, apprenticeship, military, in-plant, and private training programs, or else assume away or ignore the relevancy of such problems (Weber, *et al.*, 1968: 18, 23; USDL, *Tomorrow's Manpower Needs*: 59-63; Young).

In estimating the supply of qualified personnel to work in a given occupation, one must be careful to distinguish between the "current supply" and the "potential supply" of such staff. The former, the current supply, would consist of the sum of persons actually employed and looking for employment in a particular occupation at a particular time, while the latter, "potential supply," refers to those "qualified to work in an occupation even if they have decided to work in another occupation or not to work at all," or, in other words, those who might be able and willing to fill slots with some improvement in the relative attractiveness of that occupation vis-a-vis other occupations or pastimes (Rosenthal: 1262).

Roughly, there are three steps involved in the estimation of future supply (USDL, *Tomorrow's Manpower Needs*: 59-63). First, an appraisal must be made of the current supply in an occupation. Unless one anticipated an increase in the relative attractiveness of the occupation under analysis, as opposed to alternative uses of the employee's time, this would be "current supply" as defined above, rather than "potential supply." Second, to the current supply would be added an estimate of those expected to enter the occupation between the base year and the forecast year. Finally, from this must be deducted those expected losses from such employment through death, retirement (including emigration and labor force withdrawal temporary and permanent), or mobility to other occupations. This process might be visualized as in the diagram on the following page. The strengths of these influences upon the supply forecast will depend upon a wide range of factors, including the following: availability of job market information; transportation facilities; age of those currently possessing such skills; barriers to occupational entry; geographic and financial access to training programs; social and economic status of the occupations; length of required training; and legal barriers to geographic mobility, such as migration laws and interstate licensing differentials.

Apart from indicating in general terms the calculations necessary for such supply forecasts, estimation of the absolute magnitude of these influences upon supply for particular occupations



encounters numerous shortcomings in the available data. *Tomorrow's Manpower Needs* discusses the problem:

> The use of this method is limited, however, to a relatively few occupations. In most occupations estimates of annual new entrants cannot be developed, primarily because information on numbers entering from the various sources are not available. For many occupations, reliable information is not even available on how workers generally become qualified for their jobs. For example, among most craftsmen occupations--fields for which long periods of training are generally required--only a relatively small proportion are trained through apprenticeship or other formal training programs for which statistics on completions are available. Many craftsmen learn their jobs by informal on-the-job training. Other persons, by moving from one semiskilled job to another over a period of years, acquire knowledge and skills sufficient to become skilled workers. Others begin learning a skilled trade in vocational, trade, or technical schools. Similarly, quantitative estimates of the supply in an occupation such as typist are extremely difficult to obtain, as thousands of people learn how to type each year in schools or at home. The occupations for which sufficient information is available to develop a projected supply estimate are primarily those in the professional and technical major occupational group that have a specific training requirement. Most are in the scientific, engineering, health, and teaching occupations. (USDL, *Tomorrow's Manpower Needs*: 60)

Related Multi-Track Research

In spite of the difficulties in accurately estimating supply for particular occupational groups, a number of research efforts analyzing the manpower supply system have been undertaken, ranging from appraisal of the efficiencies of alternative training routes to development of data collection systems for the appraisal of training output by institutional type, occupation and geographical area.

Franke and Sobel have analyzed six occupations in short supply at going wage rates to examine the adjustment process through which the market responds to this tightness. The occupations they examined were licensed practical nurse, medical technologist, tool and die maker, tool and die designer, engineering technician-electronics, and engineering technician-metalworking. Their research illustrates the wide variety of ways in which skilled and technical workers may receive their training:

> Engineering technicians may receive their occupational training in a variety of ways. Training may be obtained in formal training programs offered in technical institutes, junior and community colleges, area vocational technical schools, extension divisions of colleges and universities, technical and technical-vocational high schools, as well as through upgrading. Persons can also become qualified for technician jobs by completing an on-the-job training program, through work experience and formal courses taken on a part-time basis in post-secondary or correspondence schools, or through training and experience obtained while serving on active duty in the Armed Forces. It is also possible for engineering and science students who have not completed all requirements for their bachelor's degree to qualify for technician jobs after they obtain some additional technical training and experience. (Franke: 194)

Their work indicated that not all routes to skill acquisition were equally effective, particularly when appraised by employers, and that even relatively expensive (in terms of tuition) training programs may provide less than adequate preparation (Franke: 328-40). Another important finding in their work was that utilization of one means of shortage alleviation often referred to by economists, that of adopting capital intensive labor saving techniques of production, is less a function of labor market tightness than it is of the availability of such equipment (Franke: 180-1, 360-1; Doeringer and Piore: 47-8). With regard to the appropriateness of alternative training strategies, their analysis shows the importance of conducting occupation by occupation research to determine such strategies. Whereas all of the occupations they

considered, but one, could have been provided for in the junior college, that occupation, tool and die making, "differs from all the others in that nearly all of the training has to be provided by the employer in on-the-job experience" (Franke: 31-6). [Horowitz and Herrnstadt--discussed below--indicate vocational education speeds up the training process for tool and die makers.] The importance of such occupational differentials must not be underestimated in the planning of vocational education.

Another study, by Howard G. Foster, has examined the sources of trained personnel in the construction industry (Foster: 31-6). This study of the upstate New York labor market suggests that vocational education does not appear to be supplying a significant number of craftsmen and that, generally,

> construction craftsmen tend to regard on-the-job training as more helpful in acquiring skills than in-school instruction. Perhaps more importantly, however, the contribution of vocational education is in part a function of the extent to which the student can move directly into construction work without any further training. For example, of the 198 workers who indicated friends or relatives as a source of skills, 111 (56 percent) specified no other form of training. By contrast, of the 103 respondents with schooling as a source of skills, only 19 (18 percent) had no other training source. The point here is by no means that in-school vocational education is a useless form of training, but rather that in current practice it often does not complete the worker's training, that it usually must later be combined with other avenues of skill acquisition, such as military service, apprenticeship, or training in other industries. (Foster: 24-5)

Thus, vocational education in the construction trades is seen as an introduction requiring subsequent training before one is able to acquire journeyman status, thereby underscoring vocational education's role not so much as a supplier of skilled manpower but as a component in a larger system which eventually supplies or generates that manpower.

An in-depth analysis of the tool and die making trade has been conducted to determine the efficiencies of alternative training routes (Horowitz and Herrnstadt). Among the key findings of the study are the following: (1) competency was not functionally related to training track; (2) quality of the entrant, rather than the path into which he entered, was more important in accounting for competency; (3) a substantial minority of the accomplished craftsmen were high school dropouts; (4) school counselors tended to denigrate vocational education; (5) apprentices tended to be upgraded more rapidly than others, but this may have been due to

the quality of candidates selected for apprenticeship rather than the training they received; and finally, (6) of most interest to vocational educators, "only one path, vocational high school combined with apprenticeship, scored high on most measures of effectiveness" (Horowitz and Herrnstadt: 1-2). Part of the effectiveness noted in "6" may be the combination of findings "2" and "5" with the value of the introduction provided by vocational education. In other words, this track's efficiency may be derived from the degree to which vocational education and apprenticeship programs select better candidates. If vocational education, however, had enrolled the less able of the eventual tool and die makers, this would underscore the quality of vocational education's output. While their concepts of efficiency (supervisors' performance ratings, length of training, and time involved in becoming a skilled craftsman) are somewhat limited (for example, they do not take into consideration wastage involved when students trained in the metal trades enter other occupations), these partial results lend support to vocational education's role in manpower development.

Related Single-Track Research

Apprenticeship

Apprenticeship is one of the important routes to skill acquisition that complements efforts of vocational educators to supply skilled manpower. The magnitude of this track may be partially appraised from the 1970 *Manpower Report of the President*, in which 238,000 apprentices were reported in training at the end of 1968 (USDL, *Manpower Report*, 1970: 320). Of these, 132,513 (more than one-half) were in the construction trades, 56,534 in metalworking, and 12,850 in printing. These however, represent only those apprentices listed officially with state or federal agencies, and the total (registered and unregistered) may be 30-50 percent higher[6] (Groom: 392; Strauss: 324; Barber, Farber, and Henson: Appendix C). Part of the problem in determining the number of apprentices is semantic: Is the apprentice any one who is officially so registered? Anyone learning a skilled trade on-the-job? Must he meet specified hours of training? Because of these definitional problems, one student of the subject reports, "Statistics as to apprenticeship are notoriously unreliable," and, "Since there are no generally accepted operational standards as to

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[6] In another article, Farber has shown that the apprentice completion rate is a negative function of interindustry mobility and a positive function of unemployment while the number of new registrants is a negative function of average annual unemployment for the economy as a whole (Farber: 5-13).

what is an apprentice, we must be somewhat suspicious of censuses and similar data based on the number of individuals who report themselves as apprentices" (Strauss: 306, 324).

Apprenticeship, like vocational education, also has its pros and cons (University of Wisconsin; Foltman: 1117; Hanna; Kursh: 3; Strauss: 308-13). Among other criticisms it has been accused of being excessively lengthy, nepotistic, weak in related theory instruction ("completely neglected" in too many cases, was Foltman's appraisal [Foltman: 1117]), discriminatory to members of minority groups, and unduly conservative in terms of the numbers trained. Apprenticeship's strengths on the other hand, lie in that it is a proven means of skill transmission, provides a gradually increasing income to the trainee at no direct cost to the taxpayer, assures that the trainee will be provided instructors utilizing current production techniques, and provides a market for the output of the student. A surprising number of those who complete apprenticeship programs subsequently become supervisors and trainers of other craftsmen, so substantial a portion that apprenticeship may be considered the route to leadership amongst craftsmen (Strauss: 313).

Whether this relation between apprenticeship and leadership is due to the former's true value in skill and leadership development or to the politics of manpower development and placement remains to be seen. In California, for example, although relatively few graduates of full-time vocational programs move directly into journeyman's classifications, and employers have some doubts about the quality of the vocational product, part of the relative success of the apprentice programs may be explained by the fact that vocational programs are influenced by the unions themselves.

> Unions in northern California have been fairly successful in preventing school or junior-college systems from offering courses in unionized apprenticeable occupations, except in conjunction with unions' own apprenticeship and journeyman training programs. A few schools offer "pre-apprenticeship" classes, designed to lead to apprenticeship, not journeyman, status. These too, are closely controlled by the union. (Strauss: 328; Young: 168-69)

It appears, at first glance, that neither the apprentice nor vocational systems have taken maximum advantage of their opportunities due to lethargy and economic and/or political constraints.

A bit of historical and international perspective may provide clues to the probable future of apprenticeships:

> A hundred years ago clerical work, accounting, and even law and medicine were learned largely on an apprenticeship basis. Today these occupations are learned in

> schools and universities. There is every reason to believe the same sort of development will eventually occur among the few remaining occupations now considered apprenticeable.
>
> Nevertheless, it may be shortsighted to look upon apprenticeship purely in terms of its adequacy as a means of providing craftsmen for particular trades. As a nation we are now reexamining our educational and manpower policies. Our college oriented school system seems not to be meeting the needs of a large part of our youth. A glance at the European experience suggests the social desirability of giving apprenticeship a substantially more important role than it now occupies in this country. My own opinion is a pessimistic one: though socially desirable, a substantial expansion of apprenticeship is not realistically likely. (Strauss: 332)

The occupations in which apprentice programs have been most important are those of the metalworking and construction crafts (Bedell: 37). A national survey reported that among the construction, machinist, and tool and die craftsmen, significantly larger portions felt that apprenticeship was a more helpful way of learning the trade than was schooling (see table below).

APPRENTICESHIP AND SCHOOLING COMPARED FOR SELECTED CRAFTS: U.S.A., 1963

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Number in Trade (000's)	Percent Taking Training In:		Percent Indicating Most Helpful Training Was:			Ratios Most Helpful to Took Training In:	
		H.S.	Appr.	School	Appr.	OJT and Worked Way Up	H.S.	Appr.
Constr. Crafts	2850	18.2	43.9	4.3	11.0	27.0	.24	.25
Machinists	763	21.2	34.9	10.4	19.7	31.4	.49	.56
Tool and Die Makers	N.A.	N.A.	N.A.	8.8	32.6	21.5	--	--

Source: Derived from Bedell and Bowlby, Tables 4 and 11.

Note: Schooling in column 4 is not strictly comparable to column 2, the former including high school, junior college, technical institute, special school, and also company schooling (when it was full-time for at least six weeks). But high school as a percent of total school (including company schools) was roughly 50 percent for both construction and machinist trades, indicating some similarity in the importance of high schooling as a percent of total formal schooling.

In the cases of the machinists and construction craftsmen, however, on-the-job training and working the way up were felt to be still more helpful. Also, when one examines the number of workers in the machinists and construction crafts that have had high school as opposed to apprentice training in their skill, the portions having been in apprentice programs are far greater than those from related high school programs, which no doubt partially accounts for the fact that more found apprentice programs useful than did high school programs. If one can assume, and it is not certain that one can, that attitudes toward high school as opposed to non-high school education were similar within the machinist and construction crafts, then columns seven and eight would indicate that the portions of those taking high school training and those taking apprentice training, who felt that such training was the most helpful, were similar. Unexamined considerations include those concerning the quality of (1) training from the point of view of the employer, (2) current programs as opposed to those of 20 years ago, and (3) training relative to training costs. While there are inadequacies in these data, they do serve to indicate that apprenticeship has served as a valuable source of manpower development.

An estimate by the National Manpower Council of the "means by which replacement needs for skilled workers in trades having apprentices are met each year" indicates one reason for the strong support, in the previous table, for apprenticeship as opposed to schooling.

REPLACEMENT NEEDS FOR SKILLED WORKERS
IN THE U.S. IN TRADES HAVING APPRENTICES:
PROPORTIONS MET ANNUALLY BY VARIOUS TRAINING PROGRAMS

Formal Training:	
Apprentices, registered:	32.4 - 38.4%
Completing Training	12 - 16 %
Leaving Without Completing	6 - 8 %
Apprentices, not registered	14 %
Vocational School graduates	.4%
Immigrants, trained abroad	4 %
Proportion without formal training	57.6 - 63.6%
Total	100 %

Source: Estimate by research staff of the National Manpower Council, Wason: 1337.

While on the one hand, this table indicates that vocational education has not been a major direct supplier of skilled manpower to the trades with apprenticeship programs, the table also supports

the suggestion that, unless vocational education alters its current pattern of training (providing, for example, more in-depth training), apprenticeship output data is of minimal importance for planning secondary vocational programs. They say nothing, of course, about the ideal proportions to be trained formally or informally, through vocational education or through apprenticeship.[7]

The importance, for vocational education planning, of gathering information on the number of annual apprentice graduates by geographic area depends, of course, on the occupations and the levels of vocational education for which one is planning. For example, if one is considering the occupation of tool and die maker, vocational education at the secondary level will do little more than provide an introduction to the craft. In-depth training will be given either in on-the-job, apprentice, or in more advanced vocational programs. Secondary school vocational education is not conceived, in tool and die making, as a substitute for the apprenticeship, rather as a useful preparation for it. The same could be said for the secondary level programs in industrial arts: these are introductory programs that do not pretend to supply skilled craftsmen. As one moves to the post-secondary technical institute or junior college, however, programs of increasing depth will be available to the student which may well overlap with the preparation provided through apprenticeship. Consequently, the significance of apprenticeship data is considerably less for secondary program planning than it is for post-secondary planning.[8]

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[7]These relationships remain to be determined through careful cost-effectiveness studies, and, of course, one must not preclude the possibility that the ideal might be a merger of the best features of both. The importance of this research was pointed out by the national Task Force on Occupational Training in Industry: "National manpower planning could be considerably enhanced if administrators knew, for individual occupations, whether vocational education, apprenticeship, military training, or informal methods, or combinations of these approaches yield the greatest cost-effectiveness" (Task Force on Occupational Training in Industry: 109). Hollister's *Technical Evaluation* makes a similar appeal (Hollister, 1967: 80).

[8]If one seeks information about registered apprentices, this is available from the Bureau of Apprenticeship and Training of the U.S. Department of Labor. They can provide information on the number of registered apprentices by state, their trades, and number of completions by year. The state Comprehensive Area Manpower Planning System (CAMPS) reports may provide some additional aggregative information.

On-The-Job Training

Considering school, apprentice, and military training programs as formal training, the majority of American workers have never received formal training for their jobs. That is, the majority of the American employed labor force learned to perform their current job through on-the-job instruction, working their way up, from a friend or relative, picking it up, or through other relatively casual methods (Bedell: 43). The table below reflects the wide variation in the degree to which formal educational programs have penetrated various occupational groups. Nearly all of the registered nurses and stenographers have received formal training for their jobs, while among sales workers, packers and wrappers, and laborers only 16, five, and seven percent have received formal training relevant to their current job. More importantly, for the purposes of this section, the table on the following page indicates the large numbers that felt their on-the-job training was more helpful than their formal instruction.

This is not to say that the formal programs were useless or not worth their expense, rather, this data simply indicates, in very gross terms, that in the eyes of the workers themselves, on-the-job training was mentioned nearly three times as often as were formal skill development programs as the most helpful means of learning their craft. Part of this relationship can be explained by the fact that there were nearly twice as many workers who had received on-the-job training as had received formal instruction. Also, since the workers were asked which was the most important preparation for their current job, the role of formal training may have been slighted: while the formal training may have been a vital prerequisite for their previous job, and their previous job an essential takeoff for their current job, the training they received on and subsequent to their previous job might well be reported more critical to their current job given the respondents current perspective. [Moles, Blau and Duncan, for example, have shown the considerable impact of education on the level in the occupational hierarchy to which one is first admitted.] As respondents were not asked their opinions on optimal combinations of training programs (e.g., vocational education plus on-the-job training, or the military plus apprenticeship) opinions on such possible ideal combinations were not investigated.

In a 1962 survey of formal training in industry, of the 37 million workers represented by the sample, only 2.7 million were enrolled at that time in one or more training programs. Of the 3.6 million training slots (the average worker in training was in 1.3 training programs), 1.8 million were safety programs and 0.3 million were orientation courses. One and five-tenths million were to provide a fairly specific industrial skill. While the

CIVILIAN LABOR FORCE 22-64 WHO COMPLETED LESS THAN 3 YEARS OF COLLEGE: THEIR TRAINING FOR CURRENT JOB AND APPRAISAL OF THAT TRAINING
(selected categories)
April, 1963

	Percent Who Received:		Percent of Workers Who Felt Most Helpful Track Was:	
	Formal[1]	On-the-Job[2]	Formal	On-the-Job
All Occupations	30	56	12	37
Prof., Tech., and Kindred	65	67	30	35
Nurses, Prof.	92	39	56	12
Farmers and Farm Managers	21	18	4	8
Managers, Officials and Proprietors, except farm	36	57	11	33
Clerical and Kindred	54	71	22	47
Stenographers	94	66	54	26
Sales Workers	23	60	6	43
Retail	16	55	4	41
Craftsmen, Foremen and Kindred	41	65	17	37
Tool & Die Makers & Setters	65	55	41	24
Operatives and Kindred	13	62	5	48
Packers and Wrappers	5	60	1	45
Private Household Workers	10	9	5	5
Service Workers (ex. Pv't. Hsld)	25	46	12	31

(Continued)

	Percent Who Received:		Percent of Workers Who Felt Most Helpful Track Was:	
	Formal[1]	On-the-Job[2]	Formal	On-the-Job
Farm Laborers and Foreman	11	19	3	14
Laborers, ex. farm and mine	7	40	3	30

[1] Includes school, apprentice and military skill training programs.

[2] As opposed to: on-the-job instruction by supervisors or fellow workers, company training courses of less than six weeks full-time (longer: considered "formal"), and working way up. These two tracks exclude learning from friends or relatives, just picking it up, and other.

Source: Bedell and Bowlby: 43-5.

survey did not include firms with fewer than four employees, it did find that the existence of formal training programs within firms was a positive function of the size of the firm: whereas only 11 percent of firms with four-19 employees had formal training programs, 96 percent of the large (5,000 or more) firms had formal training programs.

STRUCTURE OF FORMAL INDUSTRIAL TRAINING PROGRAMS IN INDUSTRY, SPRING, 1962

Safety and orientation trainees		2.1 m
All other trainees		1.5 m
Trainees in industrial skills		385,000
Engineering and technical	110,000	
Skilled trades	212,000	
Tool and machinery operations	56,000	
Blueprint reading	7,000	
Office and other "white-collar" trainees		1,105,000
Other trainees		10,000

Source: Barber: 3.

These data reflect the importance, in the eyes of both industry and the employees, of on-the-job training. There are a number of good reasons for this historical predominance of on-the-job training (USDL, *Work Force Adjustments*: 10-12 and 96-107; Piore). First, some jobs are unique to particular plants so that their cost is most logically borne by that firm on an internal basis--to do otherwise would amount to an outright subsidy. Second, some occupational skill sets may draw heavily on skills acquired earlier in a promotional or seniority ladder. Those on the lower rungs of the ladder then constitute a ready reserve who may then be promoted/trained with relative ease when production or staff needs so dictate. Third, some training takes place simply as a function of the untrained's proximity to someone performing the skilled task. Observation, tinkering during off-hours, filling in during absences, etc., may provide relatively costless training for the employer. Fourth, internal promotional ladders also provide the employer an opportunity to observe and test the qualifications of the employee for the new position as well as higher rungs on the career hierarchy. Fifth, training for semi-skilled jobs often requires only a short period of time (two-four weeks at most), and when relatively few are needed in any particular location at any particular time, formal institutionalization of firm-specific training with instructors and special equipment may be inefficient. [If there is sufficient demand from several employers, however, it may well be more efficient to provide institutionalized training, even for short training periods.] Sixth, on-the-job production means that the training enterprise benefits from training through some production during the skill development process, thus lowering net training costs. Seventh, on-the-job training is often an example of individualized instruction, so that the trainee may progress as quickly or slowly as necessary to acquire the requisite talents. Finally, the evolutionary nature of occupations as they adjust to changes in techniques, equipment, and materials requires on-the-job training to keep current staff as well as recent trainees aware of the latest modifications. In other words, on-the-job training also provides the firm a means for coping with technological change:

> When technological change creates new jobs, there is no reservoir of experienced operators to serve as teachers. It would therefore appear that on-the-job training is impossible. This, however, does not seem to be the case. Almost all manufacturing innovations involve a process of experimentation in the design and construction of the equipment. These experiments--and the processes of installation, start-up, and debugging--substitute for the production process as learning situations. Operators and maintenance crews are withdrawn from the productive process to participate in these phases of innovations and installation. They then serve as "teachers," training the

> remainder labor complement on the job in the process of production . . .
>
> . . . much of the work performed by hourly employees in the design and construction of equipment is essential: it must get done. And those who do it learn the new job in the process. They then become the first generation of incumbents in the new job, passing on their skills to the regular operator and maintenance craftsmen in the process of production. Very frequently, the first generation consists of the vendor's own craftsmen, who work with the design engineer in the developmental stage of the new technology and then install the equipment on the customer's premises. Many firms insure that the transfer of skill will take place by inserting in their contracts with vendors a clause requiring the latter to retain responsibility for new equipment until it is operating satisfactorily. (Franke: 442-3)

On-the-job training, consequently, minimizes the importance of vocational education identifying new occupations, before they emerge, to assure an adequate supply of trained personnel. This process may, however, impede the rapidity with which new technologies may be disseminated.

The above Doeringer-Piore study should not be interpreted, however, as a refutation of the value of vocational education. They specifically report that:

> The relative disinterest of the plants in the general education provided by the school system contrasts sharply with their attitude toward specific vocational preparation. Respondents from a number of plants mentioned programs conducted through the school system which were designed to meet the special skill requirements of technological change . . .
>
> One pattern was common to these situations: the initial generation of personnel required by the new technology was trained in the plant, and in-plant training programs continued to meet personnel requirements for several subsequent generations. After the skill requirements and the methods of teaching them had been worked out in the early operation of the technology, the programs were moved out of the plant and into the schools. In this sense, they represent a long-run pattern of accommodation. (Doeringer and Piore: 110)

While in-plant instruction does have a number of advantages, its nature and context provide numerous headaches for the manpower forecaster/planner. Job content and circumstances change

constantly with the evolution of new technology and tasks. Occupational titles often fail to distinguish job differences. Stated educational hiring requirements may be determined not by the entry position but by promotional possibilities, thus blurring the actual entry level requirements. When promotional possibilities are used, of course, if the proportion of hirees promoted is small, it amounts to overeducating the labor force. One survey reports that of 150 firms, only nine made capacity for promotion a condition of hiring for skilled production jobs (Perlman: 24). Another study reviewed the literature on educational hiring requirements, questioned the validity of many educational requirements, and, on the basis of their own findings, suggest that "a wide spectrum of industry may be overstating their education requirements" (Diamond and Bedrosian: 8-9, 31-43). On-the-job training results in job redefinition, and, consequently, variation in screening and hiring standards. In Doeringer and Piore's words:

> The shifts in job design and required worker characteristics are so continuous as to defy any system of analysis dependent upon discrete categories. Moreover, in the case of technological change, the adjustment process involves innovations in these instruments which are virtually synonymous with discovery and hence are extremely difficult to predict. Present techniques of manpower planning therefore will, at least for blue-collar manufacturing jobs, inevitably underestimate the capacity of the private sector to effect adjustment. (Doeringer and Piore: 120)

This, then, underscores one of the biggest headaches facing the vocational education planner, the problem of estimating the probable portion of future manpower requirements that may be expected to or should occur through internal on-the-job training programs (Somers, 1969).

To indicate that the labor market has means of adjusting within the firm to disequilibrium between supplies of and demands for specific types of labor is not, however, to argue that the internal labor market can be relied upon exclusively for manpower development. An analysis of European labor market experience, with implications for American planning, has pointed out three important reasons for inadequate levels of internal training:

> In the first place, it is primarily the large firms that provide training, and at least until very recently, there has been very little employer-sponsored retraining.
>
> Secondly, we are not likely to do away altogether with recessions in the future, and it has been apparent in the last few recessions that a good many workers who

are laid off during the downswing, from firms experiencing rapid increases in productivity, are not rehired in the recovery period. To the extent that such cases can be identified with reasonable promptness, they can be provided with government retraining during the recession or in the early part of the upswing, at a time when opportunities for other jobs are limited. Then, when the recovery is well underway, workers laid off during the downswing may stand a good chance of being placed in the type of work for which they have been trained.

Thirdly, the workers who will be hired and trained by employers are those who can meet employer selection standards. Not only is discrimination on the basis of age, race, and sex unlikely to disappear altogether, but there are many unemployed persons who are not hired because of poor performance on aptitude tests, poor grooming, or other individual problems. Those who are subject to discrimination may in some cases be placed more readily if they have received appropriate training, and at least some types of government retraining courses can be designed to provide practice in taking aptitude tests, suggestions on applying for jobs, and the like. (Margaret S. Gordon: 197-8)

Lessons from the European experience, then, stress the importance of (1) probable underinvestment in on-the-job training, (2) those cyclically displaced and unlikely to be rehired during recovery, and (3) those unable to meet employer selection standards due to discrimination, personal grooming or mannerisms, or performance in the job application process or on aptitude tests. The latter two are the groups unlikely to benefit from on-the-job training and constitute prime candidates for vocational education.

While the above are strong arguments that would support vocational education to combat post-recession structural unemployment of the technologically displaced and those with inadequate labor market preparation, pre-employment training alone seems inadequate to resolve our problems arising from labor market discrimination:

> Education plays a vital role in eliminating the differences between income distributions for whites and Negroes. Negroes receive less education and part of the observed differences in the economic returns to education for Negroes is caused by differences in the quality of the education that is provided. The principal need, however, is for more on-the-job training. More than 80 percent of the difference between white and Negro incomes is explained by differences in the returns to experience. Negroes receive much less training. Unless this defect

can be overcome, education programs will have little impact on the incomes of Negro Americans. (Thurow: 281)

The Task Force on Occupational Training in Industry has recommended that the federal government provide financial support to on-the-job training in industry, both for disadvantaged new entrants and for upgrading of those employed disadvantaged in low skill occupations (Task Force: 7-12). Existing federally subsidized programs of on-the-job training, such as the National Alliance of Businessmen's Job Opportunities in the Business Sector (JOBS), have not, however, been adequately appraised to determine their net effect (Piore, 1970: 78-79; Stromsdorfer, forthcoming).

The basic question arising here is to what extent should institutional training supplement on-the-job training. The pat answer is, whenever it is most efficient for society to do so: when formalized institutional training is less expensive than that on-the-job, then formal institutional programs should be established. If government does not set up such programs, it would be to industry's economic advantage to do so, through joint industry training agreements, where each firm, say, paid a percent of training costs depending on the number of trainees it employs, or, say, its share of industry employment in that occupation.

It is not clear that each firm will voluntarily supply, on its own initiative, the optimum amount of training: only when the skills it provides are peculiar to that firm will it be so induced. In the case where the skills to be provided are utilized industry wide, the firm may hesitate to provide optimum training, fearing loss of such skilled personnel to other firms. In the case where in-plant training is most efficient, but firms fear loss of men to other employers, training supplements could be provided to employers through a set of educational or training vouchers (Christopher Jencks, "Education Vouchers"; Friedman: 89). Such a training subsidy would be paid as training certificates directly to students to be redeemed through any trainer or employer (who would in turn be compensated by government) in exchange for given amounts of training.

A final case for public support of training exists where there are benefits external to the employer, as is true in the case of public health workers. Hospitals, in this case, and those permanently or temporarily handicapped by poor health are not the sole beneficiaries of health manpower: all stand to gain through curative and preventive medicine as well as from the sense of well-being derived from the knowledge that health services are available. Hospitals, normally, would be financially able to purchase only that training it could cover through its own revenues. Society, on the other hand, has felt that it should subsidize the training of health manpower because there were many benefits from

such skilled personnel, and society cannot assume sufficient training would be forthcoming without the subsidy--some of these benefits undoubtedly being external to those who might receive the services. The probable externalities of the volume of training generated solely through the labor market may fall short of the social optimum.

Military Service

The armed forces are another important component of the American manpower system. Richardson's survey of the transferability of air force skills to civilian occupations found that 64 percent of the officers, 52 percent of the enlisted men with technical craft skills, but only 34 percent of the enlisted personnel with "military services skills" reported that their air force experience and training helped "a great deal" or "somewhat" in qualifying them for their civilian employment (Richardson: 177). Richardson also reported an increasing convergence of the military and civilian occupational structures. Ten percent of the officers, 27 percent of the enlisted men in technical/craft occupations, and 45 percent of the enlisted men in the "military services" skill clusters, on the other hand, found their air force experience was of no value in so qualifying them. The degree of utilization of military training depended upon the extent of the serviceman's formal education, which interacted with his skills and occupation, and often determined his qualifications for civilian employment (Richardson: 213). More education as well as military employment in technical fields enhanced the probability of the ex-serviceman utilizing his military experience successfully.

Another study, by Weinstein, of the utilization of and benefits from military experience questions the value of that training:

> 15.9 percent of Army veterans used their military training, while 28 percent of the Navy veterans did. Not only was there a relatively low rate of utilization of the skills, but we found the market did not work effectively in aiding those veterans who were interested in using their service experience. Where income is affected, the source of the income alteration is not directly due to military experience. Rather, it is the military that employed the prior skills of the servicemen. (Weinstein: 142)

Some of Weinstein's results were similar to some of those in the report by Richardson, for both reported that the assignment of military occupations tended to correspond to premilitary experience (Richardson: 96). Thus, one is led to inquire whether a similar analysis of Richardson's data would not have led to

conclusions similar to Weinstein's. The latter, however, qualifies his hypothesis, "that military vocational training has no positive impact upon an individual's post-service income," with three possible exceptions:

1) Some individuals (those with low ability) might be earning higher post-service income due to military vocational training.

2) Some nonwhites might be benefiting from their military vocational training.

3) Some true enlistees who served in a preferred military vocational area might also be benefiting from their military training (Weinstein: E-76).

The finding, that the military constitutes a source of trained technical personnel to the civilian sector, were supported by the U.S. Department of Labor study of the *Formal Occupational Training of Adult Workers*: the military was the most frequent source of training for airplane mechanics and an important secondary source of training for auto mechanics, electricians, radio and television mechanics, welders and flamecutters, technicians in the engineering and physical science areas, and still other groups of trained workers with less than three years of college (Bedell: 12, 36-7, 43-5). Very few, however, indicated that the military was the "most helpful" way of learning their current job, even in the technical areas, which is reminiscent of the Weinstein data.

Thus, while the military obviously conducts a wide variety of training programs--the range of courses is from the "three R's to courses required for a Ph.D. . . . 4,000 separate resident courses . . . 2,500 separate jobs" (Clark and Sloan: 6)--the net benefit to the civilian economy as a result of these programs may not best be measured by the numbers enrolled or the number of courses offered. As has been pointed out above, however, the military has served to supply substantial numbers with skill training, particularly in the technical areas, and vocational education and human resource planners would be wise to give considerable thought to military returnees as a complementary source of skilled manpower flowing into anticipated future job openings.

Labor Mobility[9]

Labor mobility has many forms: into and out of (1) the labor force, (2) employment, (3) geographic areas, (4) occupations,

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[9]For discussion of the concept of and research on labor mobility, see, for example, *The Geographic Mobility of Labor*,

(5) firms, and (6) industries. Considering that changes of one form may result in changes in another, all of these forms may impact on the supply of labor in a given occupation in a given area and thus, all are relevant to vocational education planning. Parnes and his associates have noted, for example, that geographic mobility is highly related to occupational mobility, and "when a young man makes a geographic move, he is much more likely to change occupation than when he remains in the same location" (Parnes: 113, 115). Unemployment among mechanically talented southern agricultural laborers, as another example, may have an impact on the supply of mechanics in the North. On the other hand, the planning of vocational education has implications for all of these forms of mobility. To supply the student with a relatively generalized set of skills will mean that a wider array of firms, industries, occupations, and geographical areas are relevant to his job search. The cost of giving him an array of generalized skills, however, may limit the proficiency he attains in any particular area, which may lower the level of the occupational hierarchy into which he might enter following completion of his training. Thus, vertical mobility may be attained at a cost of potential interfirm, industry, and geographical mobility. Also, provision of high level skills to selected high school or junior college groups may enable their leapfrogging those who might otherwise have experienced on-the-job training and subsequent vertical mobility. Vocational education planners, implicitly or explicitly, are forced to make decisions about preferred mobility patterns.

The importance of considering mobility in vocational education planning is reflected in Oklahoma's experience. In all vocational program service areas except health, namely, technical, trades and industry, business and office, agriculture, and distribution and marketing, those graduates placed in related jobs outside Oklahoma earned higher incomes than did those placed in related jobs within Oklahoma. Incomes of those in the trade and industrial training programs who left the state averaged in 1969 more than 50 percent (more than $2,000) higher than those remaining in Oklahoma (Braden, Harris, and Paul: 96). Presumably some portion of these in/out-of-state differentials are due to cost of living differences. A

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[9](Lansing and Mueller) *Urban Worker Mobility*, (Hunter and Reid) *Wages and Labor Mobility*, (Organization for Economic Cooperation and Development) and *Geographic Labor Mobility in the United States: 1957-1960*, (Gallaway).

For other references and discussion of the relation between mobility and vocational education, see, "Aspects of Geographic and Occupational Mobility in Planning for State Vocational Education Programs," and its discussion (Stromsdorfer: 137-58).

nationwide study of 5,500 trade and industrial education graduates reported that in 1964, 73, 77 and 86 percent of the 1953, 1958, and 1962 graduates had never moved to another city for employment purposes. Fewer than three percent indicated their first full-time job required a move to another city (Eninger: 12-2 to 12-9).

The same Oklahoma report also indicates that mobility varies considerably by curriculum: whereas those in the health and gainful home economics programs migrated out of the state at a rate of less than five percent of those available for placement, more than 25 percent of the technical education graduates available for placement left the state (Braden, Harris, and Paul: 34). Clearly, as these data indicate, considering the number of graduates available for placement as the number likely to fill local openings, or neglecting to consider opportunities beyond the administrative planning district, may lead to inappropriate planning decisions.

The earlier section on on-the-job training has already touched on some of the problems of incorporating occupational mobility considerations in vocational education planning, particularly the problems of data shortages concerning the extent of such training which might facilitate vertical mobility. Other relatively precise occupational data, of the sort that would be most valuable to the vocational planner, are also simply not available: in a particular area, what is the effect upon mobility of providing alternative forms of vocational or academic education, for example.

Some authors have investigated the effects of vocational education in general upon various kinds of mobility,[10] and others

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[10] J. Kenneth Little (22-23) notes that:

"Studies report consistently that high proportions of the graduates of secondary school programs find and remain in jobs in or near the community in which they attended school . . ."

"Studies of graduates of two-year college vocational programs are too few and fragmentary to get a reliable reading. However, a good hypothesis is that geographic mobility increases, as level of training increases. Leaving the community to obtain training may itself enhance mobility. No studies were found which report comparative information about location of jobs of persons in terms of whether they obtained training in their home communities or in communities some distance away."

Corazzini's study of vocational graduates in Worcester, Massachusetts, found that of 150 graduates placed in the occupations

(just discussed) have investigated the effects of particular vocational programs, such as trade and industrial education. The great variability in local circumstances and program quality require, however, more than simply national averages or data based on a small set of vocational programs in a few cities. While such research can raise relevant questions for planners to postulate during program funding, the results from an urban vocational program in a large eastern metropolitan area would be of dubious validity for vocational planning in a Mountain States town. Current trends in and the need for modifying various mobility patterns in these areas would clearly be quite different. Student interest in such modified vocational programs is also likely to be quite different, as is the capacity of different systems to change.

To put the problem another way, even if a perfect data base existed, which indicated precise current and historical interregional and occupational flows, incorporation of such data into a model would still not enable determination of an optimal vocational education plan. The weakness of the current and historical data, of course, is that it does not reflect the efficacy of proposed changes in the vocational system: one does not know in advance whether the provision of training slots for more lucrative and critical occupations in distant areas will result in the successful mobility of students into those positions. It is possible, however, to survey students to determine their interest in such opportunities and then base one's program development on such surveys,[11] once one has determined that such openings are likely to exist.

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[10]for which they received training, all took positions within the state, and only 13 took jobs outside the Standard Metropolitan Statistical Area in which they received their training (Corazzini: 119).

Lansing and Mueller indicate that "Of the attributes of the population associated with mobility two are especially important, age and education. In all investigations of mobility these two characteristics have been found to be important." Age is negatively related, with the "peak years" being ages 22-4, while education is positively related, with some attendance at college being of particular importance (Lansing: 39-54).

[11]As examples of recent interest survey instruments, see, *Ohio Vocational Interest Survey* (State of Ohio) and *Minnesota Vocational Interest Inventory* (Kenneth E. Clark). Earlier vocational interest instruments are compared in *The Sixth Mental Measurements Yearbook* (Buros).

Because of his findings of relatively little mobility among vocational graduates, Eninger questions the "opinion held by some vocational educators that schools should not necessarily confine their trade training to local employment opportunities, that they should think more broadly in terms of state, regional or even national employment opportunities" (Eninger: 12-3). While, in prosperous SMSA's, Eninger's doubts are well founded, the great diversity among vocational education planning circumstances--the fact that some programs will be established in economically retarded areas while others will be in very tight labor markets--means that the planners must recognize the nature of their local conditions and planning. Clearly, it would make little sense for programs in New York City to be based on national averages and supply a proportionate number of vocational "on-farm" agriculture graduates. Nor would it make sense for vocational programs in economically retarded areas to plan their programs on the basis of indigenous low-wage openings. As Hansen has pointed out, "there is no convincing evidence that central government programs can attract enough industry to the countryside to provide people everywhere with jobs in proximity to their places of residence." His conclusion that, "a good case can be made for federal subsidies for investment in education, health, and training in lagging regions, as well as for relocation subsidies and information programs to facilitate rational migration," (Niles Hansen: 214)[12] has considerable significance for vocational education planners. While it may make good sense for planners in economically prosperous areas with high wage openings to use local openings for planning purposes, in other areas, those lacking attractive openings for graduates, nonlocal--state, regional, or perhaps national--criteria should be utilized.[13]

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[12]Hansen quotes from Lansing and Mueller: "Educational and vocational training efforts as well as guidance programs are sorely needed to maintain or improve the quality and also the mobility potential of the labor force in redevelopment areas" (Lansing: 322).

Margaret Gordon has suggested, "If any criticism of American policies is called for, it may lie in overemphasis on identification of labor shortages in local communities and underemphasis on regional and national labor needs" (Margaret S. Gordon: 195).

[13]This strategy is counter to that suggested by *Vocational Technical and Continuing Education in Pennsylvania*. This report suggests that vocational education programs be planned on the basis not of those jobs which are most likely to benefit students but rather on those industries which appear most attractive to the community. This proposal, that "the educational program be biased in favor of the desired new industries," means that there

The validity of arguments in this discussion hinge upon the ability of states or local areas to utilize vocational education as an industrial location incentive. If by supplying, or offering to supply skilled manpower, local vocational programs are able to attract industries to their vicinities, from a local point of view, this would tend to minimize the local planner's concern with mobility. There are, however, several reasons why vocational education plays, and should play, a minor role in industrial location. As Doeringer has pointed out, hiring, training, and promotion patterns in some industries such as steel, chemicals, and petroleum are such that the external labor market is little relied upon for skilled labor: extensive promotional ladders are well-defined, so that it is not uncommon for the unskilled laborer to work his way into semiskilled and skilled production and maintenance ranks (Doeringer: 9-10). Another factor minimizing vocational education's impact on industrial location is that some industries are typically market oriented, that is, they do not locate in an effort to be close to resources but rather, the nature of their product is such that they must be close to the eventual buyers of their product. Two classic examples of this phenomenon are the retailing and construction industries.[14] Willingness of an area vocational school to provide skilled manpower for these industries will have little impact on their locational patterns.

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[13]is, inherent in their planning system, a tendency toward oversupply of trainees in "desired new industries," as opposed to probable new industries or industries located outside the planning area, to which trainees might migrate to improve their economic circumstances beyond local prospects (Arnold: 223).

Oklahoma, of course, displays a similar local and intrastate labor market bias. As is true in Pennsylvania, Oklahoma's vocational education program is viewed as a stimulus to industrial growth rather than as an instrument to promote access of her youth to jobs, regardless of whether those jobs are inside or beyond the state (Braden, Harris, and Paul: 37-8).

[14]"Industry" is being used here as an economist would use it, as a sector of the economy producing a particular type of good or service. Retailing is thus an industry in the sense that it produces the service of supplying or distributing, but not producing, goods to consumers.

Many of the points made in this section were presented by Ernst W. Stromsdorfer to the conference on Manpower Forecasting for State Vocational Education Planning in his paper, "Aspects of Geographic and Occupational Mobility in Planning for State Vocational Education Programs" (Stromsdorfer: 138-40, 148).

Another important consideration in appraising the net impact of vocational programs is that as more and more communities begin to supply skilled graduates, the relative appeal of any particular community is compromised. In other words, if only one community were supplying skilled electronics technicians through their vocational program, the vice president in charge of site selection might give that same weight in his calculations. But when all communities are willing to supply his firm with such talented personnel, on that criterion alone he becomes indifferent between communities and turns his attention to other factors.

Whereas much vocational education planning takes place at the local level, there exists the possibility of various localities utilizing their vocational programs in this regional industrial warfare. The state vocational and economic development planners, however, must be wary that their funds do not lead to social inefficiency. When one community is able to entice a firm to locate there rather than somewhere else, that community's gain is another's loss, so that there is for the state or nation as a whole no net gain. There may be, in fact, a reduction in a state's prosperity if it was necessary for the successful community to subsidize--through the promised training--the training of personnel who otherwise would have been trained on-the-job at the expense of industry.

Ideally, national, state, and local vocational education leadership would minimize interstate industrial warfare through the vocational medium. Industrial location would be determined by less flexible criteria (e.g., natural resources, transportation facilities, and markets), with the training system then responding to the given industrial location set. As vocational programs become rationalized across the country, it is hoped that vocational education will be supported less as an instrument "to attract new industries to the state," as the former governor of Ohio has expressed it, and more as a socially efficient means of improving human resources and job satisfaction (Rhodes: 46). Preferably, the firms would be encouraged to locate where they could produce with maximum efficiency, without being subsidized[15] by the vocational programs, while the latter determine their programs not on the basis of those programs necessary to attract industry away from other communities but rather on the basis of those programs which will most benefit their students, regardless of whether the students would be employed in their hometown or across the nation.

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[15]Perhaps it should be made explicit here that one can only be confident that vocational education is providing a subsidy to industry when the employer hiring the vocational education skills is the sole buyer of those skills. Otherwise, the improved skills of the graduates may be reflected in their higher wages as competing employers bid for the students' talents.

This is, of course, an argument for federal support of education, so that those areas utilizing such skilled manpower, and benefiting from the local taxes paid by that manpower, may bear some of the cost of training that manpower, regardless of whether that manpower was trained in the 3 R's or tool and die making. The sending areas, however, it is hoped, will recognize that although they are net manpower exporters, they still benefit from those exports, not only because (1) they should take pride in the success of their young people, but also because (2) the nation depends upon its young being well-trained and because (3) the improved utilization of the nation's resources would enhance its economic well-being.

These locational and mobility problems do reflect a highly sensitive political nerve, not likely to be desensitized in the immediate future:

> just as parochial locales are willing to impose both real as well as pecuniary costs on other locales in their efforts to lure industry in their areas, so too, are they unable to appreciate the wisdom of training their native residents in jobs which will require these persons to leave the locale even when such a course of action is obviously called for. The issue of vocational training and its relation to geographic mobility obviously implies vision beyond state and local confines yet the nature of the beast is such that this vision is only grudgingly forthcoming. (Stromsdorfer: 148)

"Manpower" Programs

Still another important component of the manpower supply system is that set of "manpower" programs which has been developed largely out of the nation's concern with the problem of poverty.[16] That the output of these programs is sufficiently significant to be of concern to the vocational education planner is reflected in the table on the following page. The programs include only those administered by the Department of Labor and do not include significant programs administered by other agencies, such as the Community Action Program (persons served in 1969: 108,000 in training and job placement), Transition (66,600 in 1969), and Vocational Rehabilitation (241,400 rehabilitated in 1969).

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[16]"Manpower" is often used with reference to these poverty programs, but when it is so used, it is used in a very restricted sense. To an economist programs to develop a nation's manpower include a wide variety of activities such as health, employment services, higher education, literacy, and vocational education, as well as those "manpower" programs directed toward improving the labor market status of the disadvantaged.

FIRST TIME ENROLLMENTS AND FEDERAL OBLIGATIONS FOR WORK AND TRAINING PROGRAMS ADMINISTERED BY THE U.S. DEPARTMENT OF LABOR

PROGRAM	FIRST-TIME ENROLLMENTS (000's) FY 63-69	FIRST-TIME ENROLLMENTS (000's) FY 1969	FEDERAL OBLIGATIONS (MILLIONS) FY 63-69	FEDERAL OBLIGATIONS (MILLIONS) FY 1969
TOTAL	3,680	1,001	$3,855	$1,015
Manpower Development & Training Act	1,230	220	$1,678	$ 259
Institutional Training	848	135	1,352	197
On-the-Job Training	382	85	316	56
Part-time and Other Training	*	*	9	6
Neighborhood Youth Corps	2,089	504	$1,342	$ 321
In School	585	84	(3)	49
Out of School	532	75	(3)	122
Summer	971	345	(3)	148
Work Training in Industry	**	**	***	1
Operation Mainstream	35	11	$ 87	$ 41
New Careers	9	4	42	18
Special Impact	5	3	10	1
Concentrated Employment Program	180	127	311	114
JOBS (federally financed)	51	51	275	161
Work Incentive Program	81	81	110	101

* - included in data for institutional training.
** - included in data for out-of-school NYC.
*** - data not available for prior to fiscal 1967.

Source: *Manpower Report of the President*, 1970, p. 304.

Pros and cons of these programs are considered elsewhere, (Mangum, 1969; National Manpower Policy Task Force) recognition of both strengths and weaknesses in the programs being widespread. The important points to be made here, however, are (1) that to the extent that vocational education and the rest of the educational community do their jobs, many of the manpower programs will eventually become irrelevant, and (2) until that day comes, those programs are a significant part of the relevant supply system to be considered by the vocational education planners.

Other Sources of Manpower

The above discussion of training tracks is clearly an incomplete listing. Among the skill development routes not examined

above are correspondence courses, private business and technical schools, and training not directly related to the occupation, such as general or academic education. Without pretending to have provided a comprehensive analysis of direct and indirect, public and private, or formal and informal routes to job skills, brief (due partially to data inadequacies) comments will be made first on training through correspondence, then, private business and technical schools, and finally, a short discussion of shaping square pegs to fit round holes.

The magnitude of participation in correspondence courses is reflected in survey data from the National Opinion Research Center.[17] This survey, somewhat dated as it was taken in 1962-63, estimated that 1.8 million adults were involved in correspondence programs, one-third of these activities being vocational. The National Home Study Council estimates the sources and magnitude of correspondence study as follows:

CORRESPONDENCE STUDY

Organization	Student Body
Federal Government and Military Establishments	2,500,000
Private home-study schools	1,600,000
Religious Organizations	500,000
Colleges and Universities	200,000
Business and Industrial Associations	20,000

Source: National Home Study Council, quoted in, "Correspondence Study: Rewards for the Resolute," *Occupational Outlook Quarterly*, December, 1968.

While not all of this is vocational training, as reflected in the earlier survey data from the NORC, a significant portion of it clearly is. Those courses offered by the private home-study schools, for example, are predominately business and technical courses. Correspondence courses, then, are simply another of the many significant ways our economy has found to adjust to changing manpower requirements.

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[17] The NORC study is quoted in, "Correspondence Study: Rewards for the Resolute," *Occupational Outlook Quarterly*, December, 1968, from which was taken all the data on correspondence courses referred to herein.

Like correspondence programs, the private business and technical schools, too, make a significant contribution to the nation's manpower development program. That enrollment in these programs is not inconsequential is reflected in the table below:

ESTIMATED NUMBER OF STUDENTS IN PRIVATE VOCATIONAL SCHOOLS IN THE U.S., 1966

Occupational Category:	No. of Students:
Trade and Technical	835,700
Business	439,500
Cosmetology	272,500
Barber	15,900
Totals	1,563,600

Source: A. Harvey Belitsky, *Private Vocational Schools and Their Students* (Cambridge, Massachusetts: Schenkman; 1969), p. 9.

To provide some perspective on the magnitude of this effort, total federally reimbursed enrollment in secondary school vocational education programs, in the same fiscal year, was 3,000,000 (USDHEW, *Vocational and Technical Education: . . . 1966*: 3).

There are several reasons for the vigor in the private vocational school industry. Central to their existence is their flexibility in providing courses (1) not available elsewhere, (2) to students with educational and financial constraints that may require attendance for either short and intensive periods or somewhat extended periods of time, (3) throughout the day, evening, and year, and (4) with varying educational requirements. An example of the latter would be the fact that 43 percent (514) of more than 1,000 schools reporting on a survey indicated, directly or indirectly, that one or more of their courses required less than a high school diploma, and 23 percent indicated they had one or more courses into which one with nine years of education or less could be admitted (Belitsky: 28).

Data from Oklahoma's OTIS project reflects the relative labor market success of the private vocational school in that state as shown in the table on the following page. Clearly, there are numerous variables not examined in this simplistic tabular analysis. Age, years of schooling, and aptitudes, for example, might well explain some of the differences. Nevertheless, it seems unlikely that the entire set of differences could be so explained away. Presumably the enrollees, in many cases, have some evidence (through friends or relatives, for example) that such programs do

COMPARATIVE MEDIAN YEARLY SALARY
OF GRADUATES FROM PUBLIC AND PRIVATE
VOCATIONAL AND TECHNICAL PROGRAMS (1969)

Program Service Area:	Salary: Public	Private	Private-Public
Technical and Trades and Industry	$4000	$6400	$2400
Business and Office	3600	4000	400
All Programs	3900	5400	1500

Source: Estimated from Braden, Harris, and Paul, p. 103.

yield labor market or other benefits and are willing to gamble their tuition on that evidence. First cuts at examining the evidence seem to indicate their risks were not totally unrewarded. In summary, then, the private schools too must be considered as an important input into the vocational education system.

Finally, the vocational education planner must recognize that the relationship between training and occupational employment is not a rigid one. People from widely divergent backgrounds may fill similar occupational roles. An analysis of training received by persons with specific occupational affiliation reported as follows:

> The relationship between training and current occupation is somewhat more difficult to interpret for those whose formal education stopped before the completion of three years of college. Except for three occupations, professional nurses, barbers, and hairdressers and cosmetologists, where licensing requirements are quite rigid, none of the 31 occupations for which the study provides both specific occupation and specific training data had as much as three-fifths of their workers with training directly in the occupation pursued, and most had considerably less than half with such training. Nevertheless, . . . a relatively high proportion of workers in many of these occupations had had some type of formal training. The crucial question is how much of the "other" training taken can be construed as related to the occupation? (Ann R. Miller: 73)

The adaptability of manpower--that is, the ability of people trained in one specific field or with only general academic training to undertake new jobs--has meant that through ingenuity of the employer and/or on-the-job training, square pegs have been made to fit into round holes. In some cases this may have reflected manpower waste, while in others it may have reflected improved use of manpower, as dissatisfied workers were able to adjust to more satisfying positions.

In any case, this flexibility means that even if it were possible to forecast employment by specific occupation with great accuracy, there is no guarantee that trainees from specific training programs will take jobs for which their training was designed. It is also true that this same labor market flexibility means that substantial numbers of skilled positions will be filled without any formal training.[18] Thus, not only are there likely to be substantial numbers of skilled positions filled by those with training for different occupations, but there will also be substantial numbers of skilled positions filled by those without any formal occupational training. This means that net openings anticipated in an occupation by vocational education planners may in fact be filled by not only graduates of programs in that particular skill but graduates from other skill development programs, including general or academic curricula.

MANPOWER SUPPLY INFORMATION SYSTEMS

Existing Systems

The preceding discussion of some components of the manpower supply system should have made clear the importance of obtaining information about the structure of this supply system. Several beginnings have already been made toward the development of such supply information systems, and some of these will be mentioned here.

One form of manpower information collection is represented by the Nebraska employer survey of future vocational graduates' opportunities (Nebraska). In the Nebraska variant of this technique employers are asked not only what their future needs will be but also how these needs will be filled, whether from within the firm or outside. This provides their estimates of the amount of internal training that will take place, accurate information about which is very difficult to obtain (Somers, 1969). Oklahoma's employer survey also includes estimates of the unemployed and in-plant trainees as part of the specific net occupational demand estimates (Oklahoma).

Both Oklahoma's *Occupational Training Information System* and Pennsylvania's *Vocational Technical and Continuing Education in Pennsylvania* reports developed systems for estimating the demand

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[18] Among male craftsmen, foremen, and kindred workers aged 22-34 with less than three years of college, for example, nearly two-fifths had no formal occupational training, and only four percent had three or more years of college (Ann R. Miller: 6).

as well as the supply of trained manpower on regional as well as statewide bases (Braden, Harris, and Paul: Appendix I; Arnold: 159-97; McNamara, *Planning*). Both of these approaches collect and disseminate quite detailed information: "demand," "supply," and demand net of supply for specific occupations (seamstress, key-punch operator, etc.) by type of training institution (MDTA, private schools, public programs, etc.) and geographic area within the state. The nationwide network of Cooperative Area Manpower Planning System (CAMPS) committees and the vocational education evaluation system of The Center for Vocational and Technical Education (Starr, *et al.*) represent additional sources of manpower supply information. The labor market information system of the University of Michigan represents an additional potential source of supply as well as demand information (M. S. Cohen). For national data on specific occupational demands and supplies, see the recent work of the U.S. Department of Labor's Bureau of Labor Statistics (USDL, BLS, 1971). These information systems are clearly steps in the right direction, although they do leave a number of supply questions unresolved.

Shortcomings in Supply Information Systems

Oklahoma points out some of the shortcomings in its own data, as well as that of most other information systems, when it indicates that sources of supply not included in its analysis are immigration, military returnees, company transfers, labor force reentrants, and those with generalized academic backgrounds at secondary or post-secondary levels, who cannot be allocated to specific occupational areas; e.g., college graduates with general business or liberal arts degrees (Oklahoma: 37).

The Oregon Department of Employment has developed a handbook for estimating supply by occupation, which even allocates to occupations those who have dropped out and the general education graduates of high schools, community colleges, and universities. The methodology employed is to allocate persons with non-occupationally specific skills on the basis of past-employment. Thus, the forecast of future supply is determined by past demand, which may well be accurate, for some occupations, but this technique fails to acknowledge, analytically, the homogeneity of the supply pool for the wide range of relevant occupations. This approach then, for these nonspecifically skilled individuals is really a forecast of their employment rather than their supply: they constitute a supply for a large number of occupations, the forecast being a forecast of the future employment of that supply rather than a useful determination of occupationally specific supply. In other words, this technique could not be used to determine net openings in the sense discussed earlier in the present report (McKinlay: especially Chapter V).

Paul A. Weinstein suggested development of a clearinghouse for informing relevant employers and placement services of the availability of skilled military returnees. This would not only help alleviate critical civilian skill shortages but would also facilitate the transition from military to civilian status. If the state employment services accepted this clearinghouse responsibility, it would be quite natural for them to plug this data into the supply estimates they feed to the vocational education planners (Weinstein: 148-50). For a description of the current counseling, training, and placement services now available to veterans, see the 1971 *Manpower Report of the President* (USDL, *Manpower Report*, 1971: 61-64).

In addition to the head counting of flow patterns discussed above, for optimal resource allocation in the manpower training system, one would need additional kinds of information: generally speaking, costs and quality of training received through alternative paths, and the benefits resulting from one training strategy versus another for given occupations. Clearly, the gathering of such information for all possible training routes is subject to diminishing returns, and at some point the costs of additional data will become greater than their utility. Yet the value of gathering significantly more information than is currently available has been clear to researchers in the area, as is suggested in the following comments by a former Secretary of Health, Education and Welfare:

> When we survey the voluminous, yet unsuitable, data now available for assessing the products of education, we must conclude that practically none of it measures the output of our educational system in terms that really matter (that is, in terms of what students have learned). Amazement at the revelation of the tremendous lack of suitable indicators is almost overshadowed by the incredible fact that the nation has, year after year, been spending billions of state and local tax dollars on an enterprise without knowing how effective the expenditures are, or even if they are being directed to stated goals . . .
>
> . . . Less than one-half of one percent of the nation's total outlay for education is spent on research and development, compared with 10 percent of total outlay in other major industries--nearly 20 times as much is spent on health research and 60 times as much, on defense research . . .
>
> New measures of educational activities and achievement must be developed and old measures revised to present a composite picture of the status and direction of the American educational system. The urgency of doing so cannot be overstated. The high purpose of American

> education places this task in a rank of high priority; its accomplishment must proceed without delay. Developing the needed indicators is the joint responsibility of both public and private interests--government, business, educators, labor unions, and civic and community groups. (Wilbur J. Cohen: 89-90, 97, 101)[19]

The importance of improved manpower information was underscored in 1968 by the U.S. Employment Service's Advisory Committee on Research, (U.S. Employment Service's Advisory Committee on Research) is reflected in the new forecasts discussed in earlier chapters, and is the subject of current work at the U.S. Department of Labor (USDL, *Manpower Report*, 1970: 199-205). These new efforts are to provide not only national but also state and local data, information on worker welfare (earnings, as well as hours and working conditions), and insights to the educational planner and vocational counselors as well as the industrial or labor economist.

These efforts in the manpower-labor community, plus the efforts described earlier within the educational community, (Starr, *et al.*; Arnold; Braden, Harris, and Paul) suggest that while profound data deficiencies currently exist, there is ferment in the research community and some reason to hope that progress will continue to make planners increasingly aware of the consequences of their strategies.

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[19] A former director of the Bureau of the Budget has similar concerns: " . . . while our existing data systems (national income accounts, flow-of-funds, etc.) have performed well for macro policy decisions, they are highly imperfect or completely useless as a measure of performance and as a means of setting goals in the micro areas of social programs (manpower training, education, health care, and so on)" (Charles Schultze: 13).

CHAPTER III

CRITERIA FOR VOCATIONAL EDUCATION PRIORITY DETERMINATION

Implementation of an effective vocational education program requires the examination, control, and integration of numerous pressures, criteria, and influences, ranging from the political to the academic. This chapter will examine several program evaluation criteria, and Chapter IV will suggest a means for their integration into a resource allocation system. Since the principal objectives for vocational education must be determined by the program administrators, in response to public manifestation of preference through the media, opinion surveys, advisory councils, hearings, legislation, or indirectly, the ballot, this report will critique but make no definitive ordering or weighting of priorities. Instead, the costs of selecting or weighting heavily one priority at the expense of another will be suggested, along with data sources for plugging in the real world to the planning model.

ACADEMIC PERFORMANCE

The 1968 report of the Advisory Council on Vocational Education has indicated that the "dichotomy between general and vocational education is false and must be eliminated" (Advisory Council: 370; Mangum, 1969; 143). This conclusion is based on their observation that

> the process of worker adjustment to job needs is not confined to his school years but must go on throughout his worklife. Rapid technological change cannot be accurately anticipated for 40 years--the length of worklife. No matter how carefully a worker chooses his field in the outset it may be necessary for him to change occupations in midstream, perhaps several times during his career. This means, first, that we must not only equip the worker with an occupational skill, but must also develop his flexibility and adaptability--in improving his skills in his present occupation, in keeping up with technological advances which affect his work, and, if necessary, in learning entirely new occupations so that he can change his occupation, industry, or even residence in order to

> adapt to the changing demands of the job market (Advisory Council: 338).

With horizons extending beyond specific skill preparation to the provision of those basic talents enabling the graduate to adapt himself to changing occupational, industrial, and geographic demands for labor, the Advisory Council then suggested that

> the frame of reference of vocational education should shift from job-centered training to that of employability which includes other educational characteristics essential for job attainment and career mobility (Advisory Council: 368).

This shift of emphasis from job-specific skill preparation to a more general employability was reflected in the innovative programs reported in the 1968 report. In the words of the report,

> One of the common components of the representative programs was a concern for making education more relevant and meaningful for the student . . . Several of the programs are structured to make general education more meaningful through its practical relationship to vocational education. The converse is true in other programs where vocational education or information are resultant from the general education. The integrated and complementing function of the one to the other is seen as one of the more significant trends taking place (Advisory Council: 358-9 and 360-67).

These concepts (1) that the dichotomy between vocational and general education is counter-functional, (2) that workers must be provided that flexibility which will enable them to adapt to changing employment opportunities, and (3) that vocational education can provide a medium through which general education becomes more meaningful, plus (4) the 1970 National Advisory Council's underscoring the essential nature of "communication skills, mathematics, and some ability in problem solving," (National Advisory Council, *Third Report*: 4) all suggest that if vocational education provides a climate more conducive to academic achievement--in the sense of the foregoing general skills in math, communication, and problem solving, as opposed to job specific skills such as welding--it will have made a significant achievement toward employability for its graduates. This is the context in which academic achievement is suggested as a possible goal for vocational education. Marland, for example, has included--in his proposal for comprehensive testing of those leaving high school for job entry ability--the 3 R's, personal characteristics, and level of competency achieved in entry level criteria (Marland: 1970).

In suggesting that academic achievement be used as a criterion by which vocational education might be appraised, it is not being suggested simply that grade point averages, or literacy levels of vocational graduates be compared with those of general or college preparatory students. Utilization of such a control group would clearly be highly inappropriate because it would fail to consider a large number of other academic success related variables. A more reasonable comparison might be improvement in scores of vocational education graduates with moderate or low academic but high or moderate mechanical aptitude on literacy or mathematics tests compared with the improvement in such scores for general or college preparatory students with similar aptitudes. Control for socioeconomic background might be another critical factor. In any case, such tests are available, (Buros) and it would not be unreasonable for vocational education, during the legislative and administrative budgetary wars, to attempt to defend itself on such grounds. Accordingly, it would not be unreasonable for various curricula within the vocational arena partially to support their demands for more funds with evidence that they do have an impact on academic achievement.

Summary

Since (1) the dichotomy between vocational and academic education is counter-functional; (2) workers require preparation that will enable them to assume not only their first job but also subsequent, perhaps relatively unrelated jobs; (3) communicative skills, mathematical competency, and problem solving capacity are general/academic education skills that might facilitate such mobility; and (4) vocational education may, when properly designed, facilitate preparation for occupational flexibility, therefore, it would not be inappropriate for vocational education programs to have as one of their evaluative criteria the extent of such generalized skills acquired by their students.

WAGES OR INCOME

Among the most commonly accepted indices of labor market success is that of wages or income. Wages can be defended as the most important of these two because it reflects the value of the skill per hour, and it eliminates the problem of underutilization of skills due to a slack economy (for which vocational education really cannot be held responsible). Income, on the other hand, can be defended as the more appropriate index of labor market success because it reflects one's total annual receipts, inclusive of unemployment and underemployment considerations. Income, on the other hand, may be deceptively high if the graduate or dropout is forced to moonlight to earn a satisfactory living.

These earnings indices might guide vocational education planning in at least two ways: first, it would not be unreasonable to direct vocational resources into those programs in which reasonably attractive wages are offered; and, second, if vocational education graduates do not receive higher incomes than members of their cohort with similar aptitudes but general education, when they enter similar occupations, then one might question the value of that vocational education program. Thus, if vocational education successfully prepares youth for the world of work, presumably this preparation would be reflected in the earnings received by these youth. That is not to say that if vocational graduates do not receive higher incomes than non-vocational graduates then the program has failed. Rather, if youth with similar aptitudes enter similar occupations, one would assume the person trained in a related vocational education program would receive some kind of financial recognition for his training: such recognition may take such forms as higher starting wages or shorter training periods resulting in more rapid pay increases.

Because earnings play such an important role in social and occupational status,[1] one would not expect vocational education to prepare youth for occupations with little financial incentive.[2] Given a youth's capacity to learn and his interest in a vocational area, one would expect that he would be trained for the more rewarding positions. In the case of students with limited capacities, however, one may be forced to accept more modest earnings and status as the occupational goal.[3]

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[1]Analyzing "excellent" and "good" occupational prestige ratings, "five-sixths of the variation in aggregate prestige" was accounted for by the variables of income and education (Blau and Duncan: 118-20).

[2]This would be true assuming no other equally strong motivating factors. The wage incentive differential between two jobs is usually only enhanced by examining supplementary benefits, the ratio of supplements to earnings varying positively with earnings (Rice).

[3]One must hasten to distinguish here between academic achievement or performance on IQ tests and capacity. Academic competence must also be distinguished from mechanical and other forms of competence. If vocational education is to reduce the "flow of untrained youth" into the "pool of the unemployed," as the *Second Report of the National Advisory Council on Vocational Education* suggests, compensatory educational programs for those handicapped more by poor elementary education than learning potential may become critical components in the strategy of preparation for work.

Neither economists, in their manpower planning, nor educators, in their design of school systems, have historically given great weight to the earnings variable. Employment forecasts and estimates of openings have been the traditional--though limited--manpower concern, as witnessed in the plans of state vocational education programs submitted to the U.S. Office of Education. As one economist has pointed out, however,

> it is doubtful whether one can define the optimum education for an occupation without introducing earnings, a variable that so far has been ignored by manpower forecasters (Blaug: 282).

Another economist points out that even the utilization of employment or job openings forecasts may be misleading unless such estimates are combined with earnings information:

> Put more emphasis on projections of wages and earnings potential as the basis for manpower development decisions. The projection of so-called shortage of professional social workers at a low noncompetitive salary level might not be an appropriate signal for accelerating training in that area, whereas a projected balance of supply and demand of an exceptionally high paid occupation might suggest a fruitful area for more education and training (Joseph, "Comment": 165).[4]

Based on the fact that youth (recently discharged veterans) in the ghetto sometimes even turn down civil service jobs paying between $2.50 and $2.80 an hour, Eli Ginzberg suggests, in this regard, that the problem in the ghetto is not simply the availability of jobs for youth, but the availability of "acceptable jobs," those paying more than minimal wages (Ginzberg, 1969: 4).

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[4]Joseph's suggestion is underscored by some findings of an OECD team. Generally, the team found an absence of correlation between wage change and employment change, either by industry or occupation, but existing wage structures (relative levels) may enable changes in employment structure without wage changes. "But there are indications that the supply of entrants and trainees to a qualified occupation varies with the earnings which the occupation is from time to time expected to afford. This may be of particular importance in the case of certain occupations which emerge as a result of technical and economic change, particularly if such change is proceeding at a rapid rate. High earnings may be a necessary condition to help overcome the labor shortages which are characteristics of these occupations in the short run." (Organization for Economic Cooperation and Development: 16, 19, 130-1).

From the point of view of the vocational educator, then, the problem is one of training the youth not for any job, but for those jobs paying relatively attractive wage rates.

The use of wages as a guide in program development would not mean training only for elite skilled occupations; rather, it should be interpreted as a request to avoid training for poverty incomes. In one state--to be commended for its willingness to collect and disseminate vocational data--among prospective May, 1969 graduates reporting in the Fall of 1969, only the technical education graduates reported median salaries over $5,000 ($5,667, to be exact), health graduates were next, earning $4,212, while the rest earned less than $4,000. Home economics gainful ("less than $3,000") and distributive education graduates ($3,222) earned less than the $3,531 national poverty index for an average family of four in 1968 (Braden, Harris, and Paul: 120; USDL, *Manpower Report*, 1970: 120).

This is not to assume that the graduates' incomes will remain at these levels. Eninger's data, for example, indicates that those trade and industrial graduates (with no college education, who had six or more months employable time) out of school 11 years were earning $2,230 more than those (also noncollege, etc.) only two years out of school (Eninger). Nor should one conclude from the above paragraph that distributive education and home economics graduates in this state enter poverty. For example, to make such an argument one would have to show he supported a family of four at age 18, had no other sources of income, and faced a cost of living equal to the national average.

Due to many analytical failures to control for important variables such as aptitudes, interests, and attitudes, substantial uncertainty surrounds the degree to which vocational education in general, or any curriculum in particular, conveys to the student a decided labor market advantage. What is clear is a considerable divergency among the curricula in labor market success, with some graduates from some curricula having far more success than others. This is one very significant finding in the Oklahoma data, and more analytical curricular specificity of this variety is clearly warranted. One of vocational education's principal research and managerial needs is precisely that: to identify those components between and within its curricula most effective in preparing youth for the labor market. Once this is done, once the youth coming out of vocational programs find they are receiving satisfying jobs and attractive incomes, the problem of vocational education's image[5] will take care of itself.

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[5]"At the very heart of our problem is a national attitude that says vocational education is designed for somebody else's children" (National Advisory Council, July 15, 1969: 1).

There is still another reason that wages are a useful (although, admittedly, not definitive) guide to vocational education planning. As pointed out in the 1970 *Manpower Report of the President* (pp. 16-18), the net impact of a manpower program on the economy depends upon an assessment of several factors: (1) the number of graduates and dropouts from the program who obtain jobs through receipt of training; (2) the number of trainees who lose jobs because of inadequate training; (3) the portion of members of a control group who also acquire jobs; and (4) the number of members of the labor force who either lose or fail to obtain jobs as a result of competition from graduates of the training program ("substitution effect": the substitution of men formally trained for those who otherwise would have been trained on-the-job). Given these data, one would then work through the following calculation:

From:	Initial placement of graduates and dropouts obtaining jobs through receipt of training;
Subtract:	Those trainees who lose jobs due to inadequate training;
Subtract:	Product of the control group placement rate times the trainee population;
Subtract:	"Substitution effect": those who lost or failed to obtain jobs due to competition from manpower trainees;
Equals:	Net employment effect.

Unfortunately, the substitution effect is a largely unexplored entity. However, since (1) there is clearly a correlation between skills and wages, and (2) the displacement effect will be minimized to the extent that the program provides skills not widely available throughout the economy (i.e., the higher the level of skill required and the less it is available, the less likely the displacement effect), training personnel for relatively high wage jobs will tend to minimize the displacement effect.

Wage and Income Data Sources

If the foregoing discussion is reasonable, there are a number of data sources to which vocational education planners may turn for wage information.

Somers and Fernbach have reported data on a nationwide follow-up of vocational education graduates, the importance of their work being not only that they have presented important benchmark information on the labor market success of graduates but also that they

have utilized multivariate techniques to attempt to control for a substantial number of non-curriculum variables. Laure M. Sharp and Thelma Myint have done a similar analysis of graduates of vocational and technical programs in junior colleges. These studies utilize the kinds of multivariate technique the complexity of the problem deserves.

A number of efforts are currently underway to generate state vocational education follow-up systems. The Oklahoma OTIS project (Braden, Harris, and Paul) has been referred to earlier and is clearly a step in the right direction. The Ohio State Center for Vocational and Technical Education has developed a follow-up system that will also provide useful earnings data (Starr, *et al.*). The Pennsylvania occupational education survey system also includes a follow-up of graduates' labor market experience, covering job satisfaction, wages, mobility, and other relevant questions (Arnold: 429-37). Although these systems need to supplement their vocational education follow-up data with program cost and follow-up information about general and academic graduates, they will be gathering useful planning information, such as earnings and places of employment.[6]

While follow-up systems such as the three just named will provide information on how graduates of specific programs do immediately upon entry into the labor force, such follow-up systems will not provide wage data for those occupations for which training programs have not yet been developed. In this case, one will have to turn to more general data sources. One such source would be the reports of local employers councils, such as Denver's Mountain States Employers Council. Such organizations gather information from employers on the wages paid for specific types of labor, and, although their reports are not always available for public distribution, when they are convinced such information would enhance their skilled labor supply, presumably they would be willing to provide the data to the appropriate agency--perhaps in a summary form, in case they are concerned about the confidential nature of a particular employer data.

The United States Department of Labor has also collected and published a considerable amount of wage information. While these reports do not and cannot cover all occupations, they do provide data on some important occupational groups and subdivisions, broken-down by region, metropolitan area, sex, and industry (USDL: *Wages and Related Benefits; Guide to Local*

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[6] While Gurin reports "a striking congruence" between wages reported by the trainee and supervisor, Borus has noted systematic biases in wage reporting, such as a tendency for dropouts from a retraining program to over-report earnings, more so than is true for non-dropouts (Gurin: 44-45; Borus, 1966: 735).

Occupational Wage Information; A Directory of Area Wage Surveys; Occupational Earnings and Wage Trends in Metropolitan Areas; Occupational Earnings in Selected Areas; "Union Wage Rates for Building Trades Workers"). An example of the detail provided by B.L.S. surveys is presented on page 78.

Ideally, a distinction should be made between entry and seniority wages: that is, a program might receive quite a different rating if evaluated on the basis of entry wages as opposed to those earnings the graduate might receive five or 10 years after leaving school. Accordingly, one might use initial placement wages reflected in six-month or one-year follow-up data for the entry criteria and the earnings reflected in either (1) a five or 10 year follow-up, or (2) an overall wage average (of all employed in the occupation) reflected in BLS or employers council wage survey. The former (follow-up) would clearly be preferable as it would take account of vertical and horizontal (inter-occupational) mobility of graduates, whereas the latter would assume that the success of program graduates was well represented by those then in the occupation. It is because of the near-total absence of vertical mobility in some entry occupations that use of both the entry and seniority wage criteria is suggested below.

Still other sources of follow-up income data are available through government record files. Borus and Tash have discussed the use of the Social Security Administration, Internal Revenue Service and unemployment insurance wage data (Borus and Tash: 33-36).

Summary

Widely accepted as indices of labor market success, wages and income reflect a multitude of conditions in relations between the supply of and demand for manpower. Wages and income are determined by supply, as well as demand. The quality, as well as the quantity of training one has received, is often reflected in his income. Being influenced by a wide variety of forces, wages--with varying degrees of precision, depending on the degree of competition in the labor market--often serve as a kind of synthesis of these pressures into an index reflecting the value society places on such services. These indices are often imperfect guides to social welfare policies, as may be reflected in a comparison of the incomes of athletes and schoolteachers, but they do provide powerful clues to the quality of the labor market entry the student may experience upon graduation.[7]

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[7]The former problem may, of course, be alleviated by society if it recognizes under-compensated occupations, by providing special subsidies to entrants in these occupations. U.S. citizens

DATA AVAILABLE FROM A B.L.S.
AREA WAGE SURVEY
The Columbus, Ohio Metropolitan Area
October, 1967

OFFICE OCCUPATIONS[1]	WEEKLY EARNINGS
Billers, Machine (Billing Machine)	86.00
Billers, Machine (Bookkpg. Mach.)	71.50
Bookkeeping-Machine Operators Cl. A	95.50
Bookkeeping-Machine Operators Cl. B	81.00
Clerks, Accounting, Class A[3]	100.00
Clerks, Accounting, Class B	81.00
Clerks, File, Class A	79.50
Clerks, File, Class B	69.50
Clerks, File, Class C	62.00
Clerks, Order[3]	91.50
Clerks, Payroll	94.50
Comptometer Operators	98.00
Keypunch Operators Class A	87.50
Keypunch Operators Class B	78.00
Office Boys and Girls	68.00
Secretaries	104.50
Secretaries, Class A	115.50
Secretaries, Class B	113.50
Secretaries, Class C	110.00
Secretaries, Class D	96.00
Stenographers, General	81.00
Stenographers, Senior	98.50
Switchboard Operators Class A	91.50
Switchboard Operators Class B	70.00
Switchboard Operators--Recpt.	82.00
Tabulating-Machine Operators Cl. A	133.00
Tabulating-Machine Operators Cl. B	108.50
Tabulating-Machine Operators Cl. C	87.00
Transcribing-Machine Operators-Gen.	75.00
Typist, Class A	82.00
Typist, Class B	68.00

PROFESSIONAL & TECHNICAL OCCUPATIONS	WEEKLY EARNINGS
Draftsmen, Class A	157.50
Draftsmen, Class B	137.00
Draftsmen, Class C	108.00
Draftsmen, Tracers	87.00
Nurses, Industrial (Registered)	114.50
-MAINTENANCE & POWERHOUSE OCCUP.[2]	
Carpenters, Maintenance	137.60
Electricians, Maintenance	147.20
Engineers, Stationary	134.80
Firemen, Stationary Boiler	113.20
Helpers, Maintenance Trades	114.00
Machine-Tool Operators, Toolroom	156.00
Machinists, Maintenance	158.40
Mechanics, Auto (Maintenance)	141.20
Mechanics, Maintenance	134.00
Millwrights	143.20
Oilers	114.40
Painters, Maintenance	145.20
Pipefitters, Maintenance	154.80
Sheet-Metalworkers, Maintenance	156.80
Tool and Die Makers	164.40
Guards and Watchmen	69.70
Janitors, Porters, and Cleaners	71.60
Janitors, Porters, & Clnrs. (Women)	59.20
Laborers, Material Handling	103.60
Order Fillers	108.80
Packers, Shipping	108.00
Packers, Shipping (Women)	83.20
Receiving Clerks	112.40
Shipping Clerks	114.00
Shipping and Receiving Clerks	107.60
Truck Drivers	135.00
Truckers Power (Forklift)	111.20
Truckers Power (Other than Forklift)	105.20

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[1]For office, professional and technical occupations average weekly salary was used as given in the survey.

[2]For maintenance and powerhouse occupations average weekly salary was determined by multiplying the median hour wage by forty.

[3]For this category a sex occupational breakdown is available in another section of the survey.

Source: *Area Wage Survey: The Columbus, Ohio Metropolitan Area*, October, 1967, 201.

Because of income's value as an index reflecting a synthesis of numerous labor market conditions and the strong role played by income in determining the graduate's status, health, incentives, and economic security, it is strongly suggested that an increased role be given to income in the process of vocational education planning. The most useful wage information would be that gathered through follow-up surveys of vocational education graduates (with at least general and academic follow-up data for controls), classified by the specific program (not "service area," such as "health occupations," but specific programs such as licensed practical nurse) and in specific schools.

JOB SATISFACTION

Another potential guide to vocational education program planning is the degree of job satisfaction attained by the graduates of the various curricula. Information on the job satisfaction experienced by graduates clearly would add a useful dimension to program appraisal, principally because it adds the psychological to the economic dimension.

The gathering of such information could be effected through follow-ups (preferably, of comparable academic and vocational students), a sample very likely being sufficiently indicative. The importance of the satisfaction dimension to the labor market experience has already been recognized in a number of research efforts, (Arnold: 435; Parnes: Chapter 6; Little: 24-5) but the significance and interpretation of the responses has been questioned. Little, in his survey of vocational education follow-up studies calls the information available on job satisfaction "fragmentary and sporadic" (Little: 24).

One study has referred to the naivete of (1) the assumption "that holding constant the wording of single attitude questions automatically ensures that its meaning is the same for all respondents and can be so interpreted," and (2) the use of "single global questions to assess job satisfaction." Noting the importance of occupational status as a determinant of such measured satisfaction, a lack of profundity in such findings is indicated:

> Students of social stratification, then are perhaps the least surprised to find that the social status ranking of an occupation predicts so much variance

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[7] working overseas, for example, receive tax free incomes because their work is considered important to our international image. The training of nurses and physicians is subsidized because it is believed to affect the public health.

> in the distribution of job satisfaction scores. In fact, many would regard the finding as trivial. After all, it doesn't require a Ph.D. to observe how much more involved and interested the manager is in his work than the bookkeeper or the bookkeeper is than the machine operator, or the machine operator than the janitor. Even casual observers may note that greater satisfaction with a job is expected of the person who holds a position of higher status; it is a social norm, an expectation of the person who holds such a position (Robinson, "Occupational Norms": 25-6).

That 80-90 percent of workers respond positively to "naive and superficial" questions may reflect first, the reluctance of the individual to demean his own job--and thus cast a shadow over his own competence--and, second, our general cultural bias toward expressions of contentment or acquiescence. Apparent contradictions in findings surrounding the usual straightforward questions lead Robinson to call for "more sophisticated indices of job satisfaction" (Robinson, "Occupational Norms": 26, 65-66).

Instruments Available

Robinson, Athanasiou, and Head have surveyed the literature on job satisfaction testing, reviewing both single and multiple item instruments, as well as providing informal ratings of the instruments. Their work would be of great value to any vocational educator concerned about either the ultimate satisfaction likely to be derived by his students from particular curricula, or the design of follow-up studies.

Summary

Although this is clearly correlated with the previous criterion, it would not be unreasonable to supplement income data with follow-up information on the extent of job satisfaction actually achieved by the student following his transition into the world of work.

PROGRAMMATIC DROPOUT RATES

The conclusion that a dropout represents an educational failure appears a bit hasty. The National Advisory Council on Vocational Education has recommended "a basic change in the national attitude toward dropouts." The Council points out, "Where our educational system fails these young people is not so much

in its ability to halt their early departure from school, as in its failure to recapture them later" (National Advisory Council, *Third Report*: 5-6).[8]

One study of high school dropouts of high ability reports, "The employment record is far brighter than reviews of literature about dropouts in general suggest" (French and Cardon: 24, 84-5). For example, 80 percent of the males had their first full-time job within one month after withdrawal (French and Cardon: 24). This study, however, considered only those with I.Q.'s of 110 or more (in Pennsylvania), and only eight percent of the dropouts fell in this range.

A statewide survey of dropouts in Ohio (see Table below) indicated that dropouts from vocational programs had I.Q.'s approximately the same as the average dropout but significantly below the I.Q. of those dropping out of academic programs.

I.Q. OF MEDIAN DROPOUT BY COURSE OF STUDY

Course	Median	Number
Vocational	92.4	2760
General	90.5	6281
Academic	108.1	462
Slow Learner	71.0	516
All Courses	91.0	10,019

Source: Ohio Study of High School Dropouts 1962-63 (Nashman, Getson and Odgers: 16).

Project TALENT's national sample data (see tables on next page) support roughly the same relationship: that dropouts from vocational programs tend to be of below average academic aptitude.

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[8]The Ohio State longitudinal labor market study confirms the latter part of this concern in its findings that those (particularly blacks) who dropped out prior to completion of high school are considerably less likely than high school graduates to have received vocational training outside the regular school system (Parnes: 21-5).

1960 10TH GRADERS
(Males and Females)

High School Program	Total	Ability Quartile Low	II	III	High
General	100%	34%	29%	24%	14%
College Prep	100	9	13	28	51
Commercial	100	35	32	26	8
Vocational	100	48	30	18	4
Agriculture	100	56	31	11	3

1960 10TH GRADERS DROPOUT RATES
(1963 Follow-up, Males and Females)

High School Program	Total	Ability Quartile Low	II	III	High
General	16%	26%	17%	9%	6%
College Prep	4	23	7	2	1
Commercial	13	18	11	9	6
Vocational	22	30	19	9	*
Agricultural	27	40	10	*	*

*Cell size too small for analysis

Source: Unpublished Project TALENT Data from Howard Vincent, "An Analysis of Vocational Education in Our Secondary Schools" (Vincent: 27, 31).

Since the low academic ability dropout rates in the above data, from vocational education programs tend to be rather high (in the above data, "commercial" programs are an exception), it is reasonable to question vocational education's role as a dropout prevention instrument. The TALENT data indicate that in absolute terms none of the programs appears particularly successful in retaining students in the low ability quartile, although in relative terms, the commercial curriculum is doing the best job. Generally, dropout rates for all curricula increase as one moves from the high to low academic aptitude group. Other Project TALENT data, however, indicate that 73 percent of the male dropouts came from the general curriculum (Coombs and Cooley: 353), which would appear disproportionate in view of the fact that only 29 percent of the TALENT 1960 male tenth graders were enrolled in general education.

One of the problems in appraising effectiveness of a curriculum in preventing dropouts is that the students have not been so classified that we can with a reasonable degree of certainty predict their dropout rates if transferred to another curriculum. It might well be, for example, that if the agriculture students had been transferred to other curricula, their dropout rates would have been still higher. There may be some motivation (say, interest in agriculture plus a need to support the family) and aptitude (say, mechanical aptitude) factors that have not adequately been controlled.

The assumption that students are acting counter to their own economic well-being when they drop out of school needs to be examined.[9] A report of a nationwide follow-up survey of students from vocational-terminal programs in junior colleges (class of 1966, followed up in 1969), concluded, "In summary, the dropout, although holding a slightly lower status job than the graduate, was generally doing just as well with respect to earnings and was satisfied and happy on his job" (Sharp and Myint: 143; Coombs and Cooley: 362). Another important study has appraised the present value of the fourth year of high school and concludes, "the value of high school graduation is . . . intimately connected with the occupational decision of the individual." Also, "the present value of earnings less direct costs of education of the fourth year of high school are negative for many occupations" (Schweitzer: 20-21; Mahew). Although dropouts and students probably did not base their decisions on data such as that presented in the study, the dropouts may have intuitively believed that it was not worth their while to remain in school. Depending on the occupation to which they aspired, this research indicates their decision to drop out may have been economically prudent and satisfying.[10] This is particularly probable in the case of a

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[9]For an example of the grossly oversimplified comparisons that are made pertinent to education and consequent earnings, the 1970-71 edition of the *Occupational Outlook Handbook* states, "Clearly the completion of high school pays a dividend . . . a high school graduate could look forward to a $94,000 lifetime income advantage over an individual completing elementary school" (USDL, *Occupational Outlook Handbook*: 19).

[10]Some sample present values of the fourth year of high school, by occupations, using a discount rate of 10 percent, are indicated below.

	White	Nonwhite
Painters, Construction and Maintenance	$2,586	---
All other Clerical and Kindred	1,826	755
Mechanics and Repairmen	47	---
Shipping and Receiving Clerks	- 959	-4,255
Truck and Trailer Drivers	-1,495	---

(Continued)

disadvantaged student, for whom the immediate family, social, and economic pressures to drop out may become overpowering. The disadvantaged students, who are forced out of the academic curricula and into the vocational education curricula, may have shorter time horizons and be more likely to accept lower-status occupations than the more apt student in the academic program. These attitudes would lead the disadvantaged vocational education student to place high value on present earnings and be less concerned about the importance of education as a prerequisite for white-collar jobs, particularly if he feels a white-collar job for him is outside the domain of the possible. The college preparatory student, on the other hand, is less likely to drop out precisely because the high school diploma is an essential prerequisite for the next step in his career, a prerequisite not always true for the vocational education student.[11]

People of varying persuasions and backgrounds are gradually espousing the idea that dropping out is not the problem. In addition to the previous view of the National Advisory Council, others have suggested that the dropout rate, from high school as well as college, may be related to the increasingly postponed assumption of responsibility by youth and that an earlier introduction to work experiences and responsibilities for students might help to bridge the increasing gap between maturity and responsibility (Bowman: 72; Menninger: 8). This delay in responsible role assumption is largely due to prolongation of institutional education. One economist and student of education assesses the transition from school to work with a broad perspective:

> Once we take fuller account of the fact that the schools are not the only non-family agencies of training and acculturation, and that some of these tasks may be better done through other channels, perhaps less concern will be given to retention in school, more to the drawing of drop-out-prone youth into active learning and working lives. (Bowman: 77)

A number of analysts have expressed doubt that high school graduation provides the widely reputed major benefits to the disadvantaged youth. Although he finds good evidence wanting, S. M. Miller suspects that:

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	White	Nonwhite
Barbers	-2,023	---
Electricians	-2,255	---

Source: Schweitzer: 19.

11 Ernst W. Stromsdorfer has contributed significantly to the author's perspectives on this problem.

> if we could parcel [*sic*] out family status in viewing the relation of graduation to occupation, we would find that graduation does not make a great difference for the boys from the working classes; it is the linkage of graduation with prior middle class status that makes the difference in the overall results of the relation of high school diplomas to occupations. (Miller, 1965: 17)

Tannenbaum phrases the problem another way:

> Negro graduates are now hardly more welcome on the job market than are Negro dropouts, because the factors that form a wall between the Negro and the rest of society cannot be penetrated with a high school education alone. The same may be true of most youth, regardless of color, who come from socially disadvantaged subcultures that produce a high proportion of the nation's dropouts. Probably the outlooks of dropout and graduate in these groups do not contrast so dramatically as one might be lead to believe from general writings on the subject. One cannot help suspecting that for these youth the benefits sought via a diploma can only be attained through far more complex, ambitious, and costly social engineering. (Tannenbaum: 17-18; Dentler and Warshauer: 8-9)

In other words, whether dropping out of school is a good or a bad thing depends on the case involved. If schools are not meeting the needs of youth, if they are merely serving a baby-sitting function, building up latent frustration as a consequence of deferred responsibility, if the youth is willing to get a job, or assume other adult responsibility in preference to idly passing time in school, then dropping out may be warranted. The home or work-place may provide a better incentive for learning for some individuals than the school. This post-schooling learning stimulus may then result in the former student's pursuit of other learning channels: evening, correspondence, apprenticeship, military, or on-the-job sources of education and/or training.

A high programmatic dropout rate may reflect either a very good or a very bad program. A bad program, of course, may cause dropouts through loss of interest. A very good program, on the other hand, may cause dropouts because a sufficient amount of training has been provided to enable them to obtain satisfactory jobs without their high school diploma or completion of the entire vocational education program. Follow-up data on the dropouts would provide strong evidence on whether or not they dropped out as a result of a very effective program. In any case, as the

Advisory Council points out, the important thing is to open the doors to additional training for the dropout.[12]

Summary

As a high dropout rate might reflect either a very bad or a very good program, or a very rational economic decision by the dropout, this report suggests that dropout rates not be used as an evaluative criterion, unless the evaluator supplements it with data such as the income or job satisfaction of dropouts.

STUDENT INTEREST

Another criterion, closely related to dropout rates, which like most others might be used in conjunction with other criteria but not alone, is that of student interest in the curriculum. If there is significant student interest in a curriculum, and if that curriculum provides economic, academic, and other worthwhile benefits to the student, then presumably that would be additional evidence that the program is worthy of support. If, however, there is widespread interest in a curriculum, but the curriculum provides no economic, academic, or social side effects for the student, then in spite of this interest, one might well question the worth of such a set of courses. To fail to provide curricula coincident with high student interest may mean (1) failure to utilize an effective dropout prevention instrument, (2) lackluster student performance in the curricula in which they are enrolled, and (3) failure to pick up the related academic skills which might have been developed through high interest curricula and which might have led to high potential occupational and geographic mobility.

Various techniques are available for determining likely student interests in programs.[13] One clearly cannot, however, simply use existing course enrollments as indicative of student interest,

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[12] One way to have the doors open as wide as possible for the dropout, as suggested by the National Advisory Council (above), would be to provide all youth with, say, 14 years worth of educational vouchers, to be used at any age and at any qualified educational or training institution, including on-the-job training. This would give the student maximum training flexibility, both in terms of the times at which and the institutions in which he would receive the training (Arnow: 16; Jencks, 1966 and 1970; Task Force on Occupational Training in Industry: 7).

[13] See note 11 in Chapter Two.

for if the student does not have attractive alternatives open to him then his enrollment may simply represent selection of the least unattractive curriculum.

To enlighten the students and add sophistication to their occupational interests and curricular selections, there is tentative evidence that provision of manpower and occupational information to the students may pay dividends. In addition to the verbal support for "exploration of the world of work" by the National Advisory Council on Vocational Education, (National Advisory Council, July 15, 1969; Advisory Council: 360-69) additional support for an occupational orientation, or introduction to the world of work, curriculum is found in the Ohio State University longitudinal labor market survey:

> When we control for years of schooling or for current occupation, mean rate of pay increases as scores on the occupational information test increase for all those educational and occupational categories of both color groups with enough sample observations to permit reasonably reliable estimates . . .
>
> . . . Low scores on the test presumably indicate some significant range of occupations that is beyond the ken of the individual. From this viewpoint, the very low scores of the youngest age category particularly are discouraging, since they suggest that largely irreversible educational decisions by high school students are being made on the basis of relative ignorance. The differences in the extent of occupational knowledge among youngsters of different socioeconomic status also are instructive, for they imply that the well-known differences in patterns of occupational choice among these groups may be caused in part by variations in how much they know about the world of work as well as by factors more difficult to remedy. All of this argues for a much greater effort to familiarize students with the dimensions of the world of work at an early age in schools. This appears to be particularly important for youngsters from culturally deprived homes if greater equality of opportunity is to be achieved.[14] (Parnes: 135, 137)

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[14]The report goes on to indicate, "It is likely . . . that our occupational information test is measuring a verbal component of general intelligence as well as the extent of labor market knowledge, and that the relationships we have found reflect the influence of intelligence. When we ultimately have a measure of general intelligence from the school records of the respondents, perhaps we shall be able to be more confident about the extent

In other words, the student's familiarity with the dimensions of the world of work (employment trends, occupational rewards, educational training requirements, and working conditions) may enhance the sophistication of his educational and vocational decisions, so that he is more aware of the consequences of dropping out of school, selecting this curriculum versus that, or living in one community as opposed to another. To base a school system's curricular structure on student's interests, after they have been participants in an introduction to the world of work, would be far more appropriate than to plan the program on relatively naive interests, where the student would be unaware of his decision's career consequences, in terms of possibilities opened and options closed.

Additional tangential evidence concerning the value of occupational information comes from a study of employment service operations. In a test of the impact of providing job searchers with supplemental labor market information, it was found that

> Negro recipients of supplemental information were significantly more successful in finding jobs during the eight-week period than were Negro participants in the control group. The same estimated relationship among the white participants is neither as large nor statistically significant . . .
>
> The fact that the net effect of supplemental information for the white recipients reaches neither the magnitude nor the level of statistical significance that was found for Negroes may be explained by the greater access and exposure whites have to other sources of labor market information. (Stevens: 152-53)

While the above refers to a study of employment service operations, it may be that orientation to the world of work programs for youth may similarly be more effective for black youth than for white.

Summary

Student interest, or the curricular enrollment preferences of the student, might well be a guide to program implementation. One cannot use enrollment data to determine student preference for courses, unless the student has a wide variety of options open to him. If the only vocational education course open is vocational agriculture, this may mask their interest in more urban or non-agriculture related occupations.

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[14] to which occupational information has an <u>independent</u> influence on labor market success" (Parnes: 138).

Student curricular preferences, then, should be determined through a curricular interest survey. Planning courses on the basis of such a survey (as one criterion) would help minimize the extent to which students would be captive audiences of program rigidity and, presumably, help increase, first, the degree of student interest in their subject matter and, consequently, second, the extent to which they develop their latent capacities.

NET TRAINING RELATED JOB OPENINGS

Among the most widely discussed criteria that might be used by planners is the number of net training related job openings expected for a particular curriculum's graduates. After one has taken into consideration the number of skilled members of the labor force expected to fill slots from other training programs, such as on-the-job, military, apprenticeship, and correspondence training, the vocational planners might then determine their program priorities on the basis of the greatest anticipated unmet need for skilled personnel. This, however, is easier said than done, for one quickly gets into the problems of what portion of the work force should be trained through on-the-job programs as opposed to vocational education, private training schools, or apprenticeship. Not only does this question touch upon problems of the efficiencies of the alternative routes, but the equity question of, for whom will the training be provided also becomes critical.[15]

In training for net openings, then, vocational education may take either a passive or an active role. It may accept as given the output trends of other training programs and attempt to train youth for the residual openings. Or, vocational education may determine that it cannot or should not compete with some programs, whereas other programs may be determined worthy of vocational education's competition, on grounds of either equity or efficiency.

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[15]One could argue that vocational education might provide training to the disadvantaged even when, say, proprietary schools or on-the-job training are meeting anticipated demand. In other words, vocational education might decide that it is so important to place blacks in certain skilled positions that it will train them even in the face of a sufficient number of whites coming from on-the-job training or proprietary programs. The efficiency argument, on the other hand, might be that current on-the-job training programs are inefficient suppliers of manpower, that in some cases vocational education may be able to provide either a better trainee for a similar cost or a similar trainee for a lower cost.

In determining net openings, therefore, there will be numerous data problems. Compounding the data gaps which are apparent in a comparative assessment of OJT, military, and other training routes (see Chapter II) are the problems arising from attempts to plan at state or local levels rather than according to national manpower trends.[16] If local employment conditions are satisfying, economically and otherwise, to the vocational graduates, then perhaps the use of local advisory committees, the local office of the state employment service, quick telephone surveys, local employer

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[16]At the national level, the Bureau of Labor Statistics of the U.S. Department of Labor is issuing highly relevant reports (USDL, *Tomorrow's Manpower Needs*; *Occupational Manpower and Training Needs*; *Manpower Requirements in Occupations for Which Vocational Education Prepares Workers*). The U.S. Training and Employment Service is also able to provide to states, occupational forecasts for that state based on national trends and the Bureau of Labor Statistic's industry-occupational matrix. The U.S. Department of Labor will also provide substate occupational data to states supplementing its Occupational Employment Survey.

For an example of an attempt to plan vocational education through consideration of the supply and demand for graduates, see the work of McNamara (1970, 1970, and 1971). While this methodology arrives at estimates of unsatisfied labor market demand by occupation, the methodology for doing so contains a number of unresolved difficulties, some of which the author acknowledges: (1) demand and supply are defined irrespective of wages; (2) critical sources of supply omitted from the analysis include graduates from general programs (general high school diploma or bachelor of arts), labor force reentry (say, females 35-50 years of age) and on-the-job training; (3) neither occupational mobility nor geographic mobility are dealt with (the former is particularly critical, for the graduates from, say, agriculture, may enter other vocational education occupations such as distributive education or auto mechanics); (4) no distinction is made between graduates with varying degree of sophistication (e.g., junior college graduates are assumed to meet needs that otherwise might be met by high school graduates; (5) other vocational education objectives (say, academic performance and/or dropout prevention) are outside the model; and (6) relative costs are not incorporated into the model, except as budget constraints, as opposed to their potential role in program priority determination.

For a model designed to project occupational employment for small areas, see, *Projective Models of Employment by Industry and by Occupation for Small Areas: A Case Study* (Harmes, James, and Springer).

surveys by instructional staff (Braden, Harris, and Paul: 38-41), consultation with local academic economists, or, preferably, some combination of these may provide a practical resolution of the problem. If, however, the school system rests in an area of less than attractive economic opportunity, then such local oriented manpower guidelines may be ill-advised. As discussed above, training for low wage local openings seems a dubious proposition if significant numbers express a willingness to take jobs outside the local, low wage district when they are so trained. Provision of information concerning the "world of work," during the earlier years of schooling, might well make the students more willing to pursue nonlocal, high wage, occupational employment and its preferatory training. Sources and techniques for state employment forecasting have already been discussed, which, when combined with other criteria such as the number of graduates from other programs, wages, and job satisfaction, should begin to yield vocational priorities. In those instances in which local, state, or national forecasts are not optimal--that is, where regional forecasts are required--such as the situation where school districts are located in labor market areas overlapping several states, other forecasting techniques will be necessary.[17]

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[17]Training for nonlocal occupations touches on the problem of what is the best strategy for training migrants or potential migrants. If they are trained in rural area schools, say, for urban jobs, this may cut down on social friction in the cities, but at the cost of receiving training that may be less relevant than it would have been had they been trained in the cities. If they are trained in the cities after experiencing unemployment (necessary to indicate they "need" training), social friction may be enhanced, but proximity of employers to training may enhance relevance and training related placement. If funds were available to provide training to all who wanted it, then the urban friction consideration would be eliminated. When programs in isolated areas are determined by local committees, there is the chance the committee may have the interests of local employers rather than the students in mind when they recommend programs. The advantage of using vocational education's adult programs for specific job related skill training in the urban areas would be that expensive skills would only need to be provided to those who specifically sought such training and who had experienced labor market frustration, as opposed to expensive skill training for all noncollege bound high school students, for example.

Thomas I. Ribich (p. 97) points out that the effectiveness of manpower programs is rather high because they are oriented only to those who actually experience labor market difficulties. Resources, thus, are not expended on those likely to experience labor market success without the training.

The increasing availability of job vacancy statistics also constitutes an additional source of information that may be used in estimating net openings. These data, however, should be used only with the precautions discussed above, these data being of principal value in appraising past and current manpower policies rather than future labor market conditions (see Chapter II).

Depending on the school district, it may well be that planners should use a combination of forecasts, local forecasts for those relatively attractive local occupations, state forecasts for those occupations with reasonable opportunities elsewhere in the state, and national forecasts for opportunities lying outside the state.[18]

Finally, another problem in determining net openings is the fact that training in a particular curriculum may prepare the student for more than one type of employment. The agricultural mechanics graduate may find that he is not only an attractive potential employee to the agricultural implement dealer but for a wide variety of occupations requiring an aptitude in and understanding of engines. If one sums up all the employment opportunities facing all graduates, and assigns--as in the case of the agricultural mechanic--more than one opportunity to each graduate, the total of opportunities then becomes greater than the total forecast of probable openings. From another point of view, if one forecasts employment options for agricultural education graduates, and adds to that separate forecasts for the options facing each of the graduates of the various vocational education curricula, he comes up with a sum greater than the total probable employment. But if one forecasts occupational employment for all simultaneously (as is done by the U.S. Training and Employment Service for state Employment Security Commissions), the fact that output flows from one training program may take related jobs planned for graduates of other curricula, means that even if curricular outputs are perfectly matched with forecast employment, such graduate flexibility may still lead to deficits and surpluses in the supply and demand for various kinds of graduates. Thus, the possibility of inter-occupational mobility upon graduation complicates the analysis of net related openings. Insertion of the placement of general and academic graduates into the analysis severely compounds the problem.

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[18]At some time in the future, one would hope that there would be nationwide feedback and/or controls on planned vocational programs, to avoid the situation in which large numbers of schools plan to supply trainees to fill a forecast deficiency of skilled labor, the aggregate of the plans then resulting in an oversupply of such trained manpower.

Summary

In the utilization of net job openings as a curricular program priority criterion, the planner would forecast first the anticipated employment in an occupation for a given point of time in the future. Then he would also estimate the likely supply of trained manpower available to meet those manpower requirements from other than vocational education sources. Subtracting the second from the first he would arrive at an estimate of net training related openings available to potential vocational education graduates. This estimate then provides an upper enrollment limit on programs.

There are a number of severe problems besetting the planner attempting to use this criterion. First, before he accepts as given the output from other programs, he must estimate (implicitly or explicitly) their relative costs and benefits: if on-the-job training is more effective and less costly, then it should be encouraged at the expense of vocational education, and, conversely, if vocational education is more cost-effective. Second, it may be that on equity considerations--say, to provide training to disadvantaged youth--vocational education should compete with other tracks (in, say, the skilled crafts) even when, after deducting from demand the supply from other tracks, net openings are not apparent. Third, estimation of the quantity of skilled positions to be filled by other tracks is a very uncertain art. Little work has been done on the relative roles of on-the-job, military, vertical and geographic mobility, and general and academic education in supplying manpower to vocational education related occupations. Fourth, it may be important to train for other than local employment openings when local student employment options are unattractive. In this case, a set of forecasts may be optimal: local, for attractive local openings; state, for attractive state openings; and national, for attractive national openings. Finally, training in a given curriculum may prepare a student for more than one occupation, which complicates the problem of probable net supply when students from various curricula and training tracks may compete for similar jobs.

Even if one could accurately forecast net related openings, unless training resources were sufficient to train all seeking training, one would still need to make judgments concerning the relative costs and benefits of each curriculum. Since job openings vary widely in their benefits to the student, other criteria must be used in conjunction with net openings (if net openings is to be used at all) to appraise the curricula.

Because (1) the actual supply of trained workers that will be available to an occupation (including those trained on-the-job as well as institutionally) is partially determined by demand; (2) the appraisal of future specific ("licensed practical nurse"

rather than "health occupations") occupational or curricular labor market demand, particularly on sub-national and sub-state bases) is hazardous; (3) a substantial portion of skill preparation is given on-the-job through apprenticeships, company training programs, and seniority systems; (4) appraisal of future occupational supply is fraught with difficulties; e.g., estimates of geographic mobility and the cost and magnitude of on-the-job training; (5) secondary vocational education instruction is basically at an introductory level; and (6) incomplete information is available about costs and benefits of public as well as private approaches to skill development, therefore, an alternative to resource allocation through "net training related job openings" analysis ("net demand," "interfacing," or "merging supply and demand" analysis) is suggested in Chapter IV, particularly for secondary vocational education programs. The alternative technique is based on an appraisal of (1) curricular objectives, achievement, and consequent priorities; (2) a labor market follow-up of graduates and dropouts; and (3) the curricular interests of students.

TRAINING RELATED PLACEMENT RATE

A number of the evaluative studies of vocational education have concerned themselves with the percent of students taking jobs in training related occupations (Starr, *et al.*: 92; Eninger: 9-33 to 9-38; Hu, Lee and Stromsdorfer: 148-9; Advisory Council: 128-35), this concern reflecting the fact that training related placement is commonly used as an index for evaluation purposes. The Advisory Council on Vocational Education, using U.S. Office of Education data, reported that for 1966, of those available for placement, 80 percent were placed either in the field for which they were trained or a related field (Advisory Council: 128). Kaufman and his associates, however, after conducting their own follow-up of students, reported, "The placement data on 1964 graduates from the technical programs indicate that the graduates . . . did not generally enter the occupation for which they had been trained" (Kaufman, *et al.*: 5-12). Having followed up trade and industrial graduates, Eninger indicates

> the average relationship between jobs held and trades studied in high school is only a little better than "slightly related." This is in agreement with the earlier finding that only about 30 percent of the graduates obtain their first job in the trade studied, and of those whose first job is not in the trade studied, very few ever enter the trade in later years. (Eninger: 9-34) [19]

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[19]With regard to the impact of training relatedness on earnings, the relationship is uncertain. Somers and Fernbach report a

The Advisory Council's report reflects substantial placement rate differentials between various vocational education curricular programs. Health's rate, for example, was 92 percent in related, as opposed to agriculture's 67 percent. The Penn State study suggests that the appraisal of related placement rates must include consideration of who is determining the degree of relatedness:

> The relationships between training and employment found by the follow-up interviews were, for many of the vocational programs, much lower than those reported by the schools. Apparently, the schools were using a more liberal definition of related employment than that used in this study. (Kaufman, *et al.*: 12-3)

The weight to be given training related placement as an evaluative criteria was carefully considered at the Princeton Symposium on the Transition from School to Work:

> There is an interesting conflict between our desire to prepare our students for a wide range of employment, and our principal evaluative measure--'proportion of students employed within three months in the occupation for which trained.' A school will get highest short-term placement records with a program which:
>
> a) prepares for employment in a particular establishment;
> b) concentrates on a particular set of skills needed for employment at that moment in time;
> c) carefully shields the student from a view of occupations other than the one for which he is being prepared;
> d) emphasizes only the desirable aspects of employment in that occupation;
> e) carefully rejects all students who would not be enthusiastically received by employers and labor organizations;
> f) encourages students not to enter higher education;
> g) encourages the student to continue in the field originally chosen, even if he finds later he is not capable or interested in it.

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[19] significant but negative coefficient for training related placement in predicting income (Somers and Fernbach: 46). Eninger's study of T and I graduates revealed significant and positive correlations between related placement and present earnings (Eninger: 3-31).

> Such a program would be extremely narrow and would be rejected immediately by any high school vocational teacher. Yet this is the program which should be followed to get high initial placement rates. (Evans, 1968: 199)

Other and related weaknesses in this criterion include the considerations that (1) as has been discussed above, placement rates as an appraisal criterion tend to overlook the displacement effect, the possibility that placement of vocational education graduates in a particular job may leave someone else unemployed who might otherwise have received the job; (2) the objective of a program may not be to place the student in a particular job but rather to provide him a set of skills (general as well as, perhaps, specific) useful in a wide variety of options so that he may select from a variety of attractive alternatives, some of which may only be remotely related to the specific skill training (e.g., machine operation) but utilizing the more widely applicable skills of, say, math and verbal and written communication (the importance of which the student may not have recognized prior to his vocational education); (3) if a program does develop a wide variety of broadly applicable skills, this would tend to reduce the placement rate, improve student's labor market prospects, but, if related placement was the sole finding criterion, cut down future programs resources.

All of these considerations suggest that perhaps this "principal evaluative measure" be reconsidered as a component in program evaluation. Preferable indices would seem to be programmatic follow-up wages and job satisfaction, costs, probable net employment effect (as discussed above, and below in the "Critical Occupations" section), and/or contribution to academic achievement scores, say, in the case of those who go on to college. This is not to say that training related placement is an irrelevant index, for it may be that an analysis of, first, the curricula with low related placement rates, and, second, the jobs taken by graduates from those curricula, would reveal means through which the curricula might be modified to provide more useful inputs to the student and labor market while therefore improving the degree of relatedness of the curricula.

Summary

This criterion is, of course, related to the earlier one of "net training related job openings." This criterion, as traditionally applied, would rate a program more highly if a large portion of its graduates took training related jobs. More sophisticated versions of it would consider only the percent of graduates seeking employment who took related jobs, thereby doing away with the problem of evaluating whether those going on into the military,

housekeeping, or higher education should represent plusses or minusses on the curriculum's scorecard.

Use of other criteria--particularly at the secondary level of training--rather than related placement, would recognize considerations such as the following: (1) students enroll in programs for reasons other than career interests--easiest route to the diploma, or because a close friend did so; (2) vocational education may be of substantial value in its role as a means to stimulate academic achievement; and (3) youth often change their career interests, and a program which does not hinder a student's education but encourages him to look beyond related occupations to those in which he would be more likely to succeed should not be penalized for doing so; and (4) if the vocational program does successfully retain students, the students may well pick up and utilize social or cultural talents that are just as important as those occupational skills which might remain unutilized.

Several reasons are suggested above for the recommendation that training related placement (particularly at the secondary school level) be eased out of its traditional role as an evaluative criterion. Other likely and more reasonable evaluation candidates include wages, job satisfaction, achievement test scores, and the probable net employment effects--as discussed above in the section on wages and below in the section on "occupational criticality." (See also, the summary of the previous section.)

OCCUPATIONAL CRITICALITY

Another criterion against which vocational education programs might be compared prior to programmatic funding is reflected in the following question: "Is the program meeting a shortage of manpower essential for the welfare of the community?" Central to this idea is an example of dubious veracity told by a high ranking member of the U.S. Department of Labor's Manpower Administration (and an economist):

> If all the economists in the U.S. were to die today, it is very unlikely that the economy would suffer dire consequences. If all the tool and die makers were to drop dead simultaneously, the economy would grind to a halt in very short order. (Paraphrased)

According to this analysis, tool and die makers are clearly critical to the welfare of society, and one would then rank their occupational criticality as being of a high order. Another example of this concept would be public health nurses, where there are substantial benefits to other then the trainees. An occupation would also meet the criticality criterion where an increase in the output of such graduates would result in an employment expansion

greater than the number of graduates: that is where there was an employment multiplier effect due to a manpower bottleneck.

Application of the criticality concept would be useful where it could be determined that (1) the shortage of such workers was due to a shortage of training facilities,[20] and (2) that such workers would not be trained in sufficient numbers with greater efficiency on-the-job.[21] One must be fully cognizant of the fact, however, that to augment the current supply of workers, when wages and other forms of compensation are already low, will simply tend to maintain a low level of rewards, thus failing to provide the economic signals necessary to pull more youth into such training and occupations.

As an example of occupational criticality sanitary collectors (or garbage men) are clearly critical to a community, but one can hardly justify training them through vocational education as they may be trained with comparative ease on-the-job. Nurse aides are also an important component of our health services system, but they too may be trained relatively quickly on-the-job. Licensed practical nurses and physicians' assistants, on the other hand, represent two other critical components of the health system that cannot be trained on-the-job without considerable inconvenience to their co-workers. LPN's and physicians' assistants clearly require a more intensive form of training than is true in the sanitary collector and nurse aide cases. Training for these critical occupations also has the additional advantage that it will maximize the net employment effect (as discussed above), in the sense of the training program being unlikely to displace someone less trained from the ranks of the employed. In fact, their employment may result in the additional employment of others, by enabling physicians to see more patients, thereby requiring more secretarial or nurse aide assistance.

Insofar as wages are responsive to critical shortages, the use of the wage level for decision-making will automatically tend to channel resources to these occupations. Recent increases in salaries of registered nurses, for example, probably reflect, to

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[20] If it is determined that the shortage is due to low wages rather than a shortage of training facilities, a systems strategy might be to subsidize current training while working simultaneously to raise wages to a level sufficient to pull future workers into the occupation.

[21] See, Chapter II's discussion of "On-the-Job Training," and the discussion below, in this chapter, on "Program Cost."

a degree, their shortage. To the extent that (1) wages are determined more by collective bargaining,[22] to the extent that (2) the consequences of collective bargaining reflect imperfect competition in the labor market rather than the needs of the community, and to the extent that (3) wages reflect the frivolity in man's nature (e.g., income received by professional athletes as opposed to social workers), then non-wage guidelines, such as occupational criticality must be constructed.

That the concept of "occupational criticality" is not well-defined is only too clear to the writers of this report. However, it would be a display of extreme confidence in the market system to assure that wages will universally reflect the critical occupations for which training should be provided. In the absence of more rigorous techniques for identification of critical occupations, less precise methods must be used.

Whether or not an occupation was to be considered "critical" would have to be determined by a group competent to determine, in the aggregate, the community interest. Congress makes such decisions when it determines that the health professions, defense related curricula, or the education professions shall receive specific appropriations. Placing high priority on housing, or ecology, might warrant designation of craftsmen or technologists in these fields as critical. A survey of representative community leaders might provide a sufficient variety of viewpoints and insights so that the educational planner might then be able to integrate their perspectives and arrive at a synthesis regarding which occupations were "critical."[23]

Summary

An occupation can be defined as critical when such a manpower shortage impedes improvements in employment, incomes, health, or other indices of the public welfare. The planner should be certain, however, that the shortage is not due to inadequate incentives,

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[22]Collective bargaining, according to one important study, has been able to raise the relative earnings of strong union members by 15 to 25 percent. Weak unions appear to have relatively little impact (Rees).

[23]The educator would, of course, have to be wary of those who would define certain occupations as critical to prevent wages from rising above some, in their eyes, unacceptably high wage level. As Garth Mangum has reminded the authors, however, "all publically supported training has the effect of restraining wage increases which may or may not be desirable."

such as the case where low wages or other rewards may account for a large number of job openings by failing to provide necessary economic signals to pull youth into some training or occupations.

Where it could be determined that (1) the shortage is due to inadequate training facilities and (2) such workers would not be trained in sufficient numbers with greater efficiency on-the-job, then the occupational criticality might be applied to encourage vocational education to step into the breach.

POTENTIAL MOBILITY

As well recognized by the Advisory Council on Vocational Education,[24] the dynamism--of today's economy--technological, industrial, and occupational change, dislocation, and growth--suggests that vocational education should provide its graduates with the flexibility and adaptability necessary to facilitate their occupational and geographic mobility when it becomes necessary for them to make such changes. It is this flexibility and adaptability that is considered here as a criterion for program selection: place higher priority, other things being equal, on that curriculum which maximizes the student's ability to adjust to changing demands in the world of work.

In pursuit of this objective, vocational educators have attempted to design curricula which will enable the student to enter not one specific job but a variety of related jobs. A grouping, or cluster, of jobs would be based on common "tasks, skills knowledge, aptitudes, work habits, or whatever the jobs require for success" (Morrison: 79). The general rationale for the clusters is that by training for a variety of closely related jobs, probability of training related placement as well as successful mobility to a second job--in the case of, say, technological displacement or an unhappy experience in the first job--would be significantly improved.

Current efforts in the development of such clusters clearly imply belief that the conventional curriculum has not been providing the vocational education graduate with optimal levels of flexibility. This criticism--that of overspecialization--is not universally accepted within the vocational education community:

> It is common to hear vocational programs being criticized for narrow specialization: "Why should schools prepare students for a single occupation when the occupational world is shifting rapidly?" This is a straw man.

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[24] See the section, "Academic Performance," early in this chapter.

In point of fact, no public school vocational program prepares a student for a single occupation, and indeed the trend has gone so far toward breadth that in some schools vocational education is more like general education than are many "general education" courses such as calculus, sixth year French, and journalism.

"Machine shop" should more accurately be named "metals trades" if you look at the actual course content; but, even if its name were accurate, it would still prepare for entrance into more than 200 occupations as defined in the *Dictionary of Occupational Titles*. Very nearly this same comment would apply to such courses as printing (really graphic arts), automotive mechanics, electronics, building trades, and most other trade and industrial education courses. Business education and distributive education are similarly broad. Production agriculture provides entry-level skills for at least fifty occupations. Homemaking and the various health occupations programs probably come closest to preparing the student for a narrow range of occupations, but even here the skills learned have applicability in many other occupations. (Evans, 1968: 198)

A recent multivariate analysis of vocational education graduate follow-up data raises additional questions about the specificity of current training: the data indicate that--controlling for other variables--graduates who took training related jobs started at nine cents per hour less than those who took completely unrelated jobs (Somers and Fernbach: 90). There are at least two possibilities to explain this significant difference: first, training may be provided for jobs providing wages and other incentives at levels inadequate to pull in the graduates; or, second, training already may be sufficiently general to enable graduates to take financially more attractive jobs outside their field of training, but sticking to the related jobs when unrelated options are not more attractive. The former implies that training may be for the wrong jobs, while the latter implies that while training may be for the right jobs, when financially attractive unrelated openings appear, the training was apparently not so constricted in content that graduates were unable to take such positions.

One cannot assume that because a student is introduced to a wide variety of related jobs through a cluster curriculum that therefore his job prospects are enhanced. It may well be that the price paid for providing breadth to the curriculum will be inordinately high in terms of depth of understanding and competence. In other words, relatively intensive training in a narrow field--in conjunction with basic general skills such as, say, mathematics and communication skills--may provide more potential

mobility than a relatively superficial introduction to a broad array of occupations.

It would be fruitless to continue discussing, on theoretical grounds, the pros and cons of broad versus specific training. Whether a curriculum is sufficiently powerful to enable the student to succeed in the world of work will not be resolved in theoretical arguments but rather must be appraised through follow-ups of the graduates. Follow-up data on (1) entry wages, (2) increases in wages over time, (3) job satisfaction, (4) the graduates' ability to find new and satisfying jobs after experiencing technological or economic displacement, combined with employment forecasts, will be far more useful in curriculum appraisal than a priori debates about in-depth training versus cluster training. These other criteria have been discussed above and should be used as proxies for potential mobility.

Summary

Educators' concern with their students' potential labor market mobility is reflected in their debates over the virtues of cluster curricula versus specialized curricula. The question cannot be resolved, however, on a priori grounds: whether a curriculum is too narrow, or too broad, and consequently, limits the prospects of its students, must be empirically determined.

Whether students are sufficiently well grounded in talents to enable them to absorb the blows administered by the economy will not be determined through an examination of the number of occupations to which the student has been introduced. Rather, stronger evidence on a curriculum's contribution to potential mobility could be found through follow-up surveys examining average entry wages, graduate wage trends, and the employability of graduates experiencing technological or economic displacement. These criteria should be used as proxies for potential mobility.

ENTRY REQUIREMENTS

Educational Requirements for Occupations

Massive grey areas cloud our understanding of the relationship between a particular job and the education required for the adequate performance of that job.[25] One of the big weaknesses in

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[25]Literature on manpower and educational planning reflects the paucity of data. "We do not really know how much education people need for their jobs" (R. A. Gordon: 33). "Really nothing

existing data on education required for an occupation is that it is very difficult to separate required education from actual education. In other words, if we simply look at the average employee in a particular job, the fact that that employee has 12 years of education may reflect--not that 12 years of schooling are required for adequate job performance--the existence of an abundant supply of people with 12 years of education willing and able to perform such a job, in spite of the fact that 10 years of education might have been all that was necessary for adequate functioning on the job (Hollister, 1967: 34-5). An example of this supply effect would be the case where, due to an increase in the number of high school trained nurse aides, hospitals may adopt a requirement that nurse aides receive such training prior to employment. Thus, whereas the *Occupational Outlook Handbook* for 1970-71 reports, "Hospital attendants generally are trained in their duties after they are hired," an increased supply of trained aides may impose such training costs on the schools whereas formerly on-the-job training was deemed adequate.

There are a number of reasons that estimates of educational requirements may be inflated. First, if relatively high unemployment characterizes a region or labor market,[26] employers may use artificially high hiring standards to weed the preferred from the less preferred.[27] Second, training requirements very likely reflect the employer's use of the entry job for potential staff to be upgraded for higher rungs on the occupational ladder (Diamond: 9; Herrnstadt and Horowitz: 325). Third, no one claims that the entire output of our educational system should exclusively be devoted to maximizing productivity: a consumption element is clearly present (Eckaus: 186).

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[25] is known about the education associated with any occupation or how or why it changes" (Hollister, discussion in International Manpower Institute: 59).

Scoville has developed a methodology for estimating and estimates of years of education for specific vocational preparation required for job families and changes in these requirements over time (Scoville: especially 24-7, 31, and 66-8).

[26] Unemployment rates for those 16-19 years old have constantly, since 1954, been above 10 percent (*Economic Report*: 205).

[27] Daniel E. Diamond and Hrach Bedrosian report on their survey of hiring requirements in New York City and St. Louis; "in seventeen out of twenty occupation-industry groups, years of schooling were unrelated to measures of job performance. These findings suggest that a wide spectrum of industry may be overstating their education requirements" (Diamond: 9).

In addition to uncertainty about the relation between actual and required education for an occupation, as reflected in historical data, there are the problems that in addition to changes in the types (skill content) of training needed for specific occupations (due, for example, to new types of technology or new manpower structures), the amount of training required may vary (due to improvements in instructional efficiency through adoption of, say, computer assisted instruction), so that less time may be necessary to impart the same skills (Hollister, 1967: 38). Thus, the use simply of historical data to estimate time needed for specific vocational preparation may be quite misleading.

While the foregoing difficulties in assessing the amount of education appear formidable, their importance should not be exaggerated. Diamond and Bedrosian's study of 10 entry level occupations, for example, found that there was no significant relationship between years of education and job performance, as reflected in income and supervisory rating (Hollister, 1967: 9). The vocational education planner, however, needs to know not only the years of education necessary but also the content of that education required. Findings of a Battelle study are particularly relevant here:

> Skill qualifications seem to be less important than evaluation or personal characteristics for most of the jobs surveyed . . . In many of the jobs, skills apparently can be learned quite quickly on the job. In others, no particular skills are needed, but merely the ability to follow instructions.
>
> There are some very important entry jobs, however (such as key-punch, industrial, or office machine operators or typists), in which specific skills are required. Most employers require that these skills be obtained before employment. (Fisher: 85)

Evidence concerning the degree to which education and skills are in fact necessary prior to hiring could be acquired through a follow-up of secondary school graduates, both academic (and/or general) and vocational.[28] If nonvocational graduates are taking jobs identical to those assumed by similarly endowed vocational graduates, and receiving similar compensation, then the value of the vocational program should be questioned. It should not be assumed, however, that simply because students take training related jobs, that pre-employment training for that job is warranted, for reasons discussed above (e.g., supply effects and the natural preference of employers to shift training costs to the schools).

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[28] Such systems are discussed in Chapter II.

A complete appraisal of whether vocational education should train for particular occupations would have to consider the question of whether instruction can reasonably be provided on the job: Do instructors exist at the job site? Are personnel at the job site familiar with the best techniques? Is instruction at the job site less expensive than in the educational/training institution? Are employers willing to risk their investment in training through the loss of such personnel to their competitors?[29]

That these questions cannot be carefully researched for each occupation, for each area, and by each vocational education planning unit is clear. If, however, the planner does examine the data at his disposal, such as follow-up records, the *Occupational Outlook Handbook*, and the *Dictionary of Occupational Titles Supplement*, and relate this information to his local and regional situation, his planning is likely to be correspondingly improved.

Other Job Entry Requirements

In addition to the educational and training requirements for job entry, there are often other requirements that must be fulfilled prior to employment. Examples of these would be union membership, conformity with discriminatory hiring standards,[30] licensing, lack of a criminal record, and certification of various levels of educational achievement. Some of these barriers to entry into a trade are clearly designed to deliberately exclude unwanted applicants without economic or legal justification. Others, such as the licensing requirement, (Karen Green) may in some instances be warranted while in others appear unjustified. The use of aptitude and job tests is another example of an entry requirement that may or may not be warranted--indeed it may be

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[29]For further discussion, see Chapter II above ("Multitrack Research" and "On-the-Job Training") the section on net openings of this chapter, and the section below, in this chapter, on "Program Cost" (Shea).

[30]Although employment discrimination on the grounds of race, color, sex, religion, or national origin is clearly contrary to the 1964 Civil Rights Act, the inability of high school graduates to receive counsel in every case of discrimination would indicate that until discriminatory barriers are broken, prevalence of discrimination in an occupation should be considered in the planning process. It may be necessary, however, to provide some training to members of the disadvantaged class to break the discriminatory barrier by providing skilled applicants from the victimized group to the employer. To do so would require volunteers willing to pay psychic costs involved in the potential litigation.

illegal--depending upon the test and the use made of it (Piker: 237-46; Coupland: 241-53). A recent U.S. Supreme Court decision, for example, outlawed job qualification testing unrelated to job performance (*Manpower Information Service*, July 15, 1970).

Consideration of the priority to be given particular vocational curricula would be found wanting if it did take into account nonskill factors in the hiring process. The aforementioned Battelle report commented on some of these:

> Personal Qualifications were repeatedly emphasized by employers . . . , and appear to dominate the whole entry scene. The most common single requirement was the records check, apparently undertaken as an indicator of honesty, dependability, and other character traits. A Police record does not seem to be an automatic bar to employment, but is studied in terms of length and seriousness.
>
> Also important are <u>health</u>, in terms of food handlers' permits, insurance and job performance, <u>attitude</u> and <u>appearance</u>. In connection with these, the impressions formed by the personnel interviewer become of paramount importance to the applicant's chances. Appearance and grooming during the interview seem to have a disproportionate impact on employability even where they are not functionally related to the job . . .
>
> Among the essentially intangible factors which significantly affect employability are <u>honesty</u> (especially important in sales and office jobs, which provide a great deal of entry opportunity . . .), and <u>dependability</u> (as reflected in terms of absenteeism, school and job records, etc.). Even the completeness and correctness with which the application form is filled out is considered, and a falsification is usually grounds for rejection or dismissal. (Fisher: 85)

The extent to which these nonskill considerations are included in the curriculum will not only affect the success of graduates in the job market, but should also affect the decision-making of the vocational education planner: those programs designed in full cognizance of entry requirements should, assuming that other aspects of the programs are similar, be given preference over those programs which do not.

Summary

Evidence on the typical educational requirements for specific occupations is very sparse, requirements referring here to skills

essential for adequate job performance rather than simply hiring standards. Follow-up information on vocational as well as general and academic graduates may, however, shed useful light on the hiring standards problem. If vocational and academic graduates obtain similar jobs at similar salaries, it may be presumed that, at least for that phase of the local business cycle, there were no specific skill requirements for entry other than perhaps those acquired through nonvocational segments of the curriculum.

In addition to education, there may be other expressed and/or de facto hiring requirements: licenses; personal qualities such as health, attitude, appearance, honesty, or dependability; or the ability to fill out an application form. When these factors are operational in the hiring process, a curriculum should be more highly rated if it gives explicit consideration to them.

EFFECTIVENESS IN SERVING THE DISADVANTAGED

One of the four basic steps the National Advisory Council has recommended--to enable fulfillment of the student's potential--is to "give priority to programs for the disadvantaged student without separating the disadvantaged student from the mainstream of education" (National Advisory Council, *Third Report*: 6). This, then may be another of the criteria--and possibly the most important--against which vocational education programs may be measured.[31]

That training the disadvantaged has not consistently absorbed a large portion of vocational education's resources is evident from

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[31] One may question the extent to which vocational education should be serving the disadvantaged: (1) this is clearly the function of the Department of Labor, which is specially geared to do so, and (2) current legislation is geared to the development of two tracks: vocational education and a system for training the disadvantaged (Somers, n.d.; USDL, *Manpower Report*, 1970: 193-97).

If one defines the disadvantaged as those who have already experienced labor market difficulties, then one might question whether it is the responsibility of vocational education to train them. The educational voucher proposal would leave it up to the student as to whether he would enter OEO or vocational education programs. If one defines disadvantaged as those likely to experience labor market difficulties, however, vocational education would then, presumably, make a major contribution to labor market efficiency if it provided sufficient services to those otherwise likely (on the basis of background variables) to experience labor market problems, so that after vocational education they did not experience such difficulties.

the fact that in 1968 only three percent of vocational education enrollees were disadvantaged. This three percent included both those in programs designed specifically for the disadvantaged as well as those enrolled in regular programs (USDL, *Manpower Report*, 1970: 68). In 1966, of the total federal, state and local expenditures on vocational education of $800 million, only $5 million was spent on programs for those with special needs; i.e., those with academic, socioeconomic, or other handicaps (Advisory Council: 140, 150, 263-4, and 373-4).

Just as manpower programs appear relatively effective because they concentrate their energies on those likely to have low incomes in the future, (Ribich) so vocational education's utility as an antipoverty instrument is enhanced to the extent that it channels high quality training to those disadvantaged likely to experience labor market difficulties.[32] "High quality" must be stressed here because "nonwhite persons are still often trained for low-skill occupations" (General Report of the Advisory Council on Vocational Education: 264). The importance of reaching these disadvantaged groups has been recognized by, among others, Congress, the U.S. Department of Labor, and the National Advisory Council on Vocational Education (U.S. Congress, (90th): 17; National Advisory Council, first three reports).[33] Attempts to expand black enrollment in vocational education, however, are not universal, and in spite of the fact that "Negro graduates of vocational curricula have been less disadvantaged relative to their white counterparts than Negroes from other curricula (in terms of wages and status of their first jobs)," there is a tendency for "some school officials to discourage Negroes from enrolling in the vocational curriculum" (Piker: 148).[34]

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[32]Considerable work has been done on analyzing characteristics of youth entering the labor force (Piker: especially Chapter 2).

Data from a unique longitudinal study is currently being analyzed and will soon provide educational planners with insights for predicting young people likely to experience early labor market difficulties, as reflected in earnings. Among the variables analyzed will be ability, quantity and quality of schooling, socioeconomic background, and health indices (Kohen).

[33]For discussions of the economic loss due to discrimination, see Samuelson, p. 783 or Naisbitt, p. 467.

[34]An evaluation of a job training program's Negro youth found that provision of a skill was critical both for its economic as well as motivational benefits, the latter being increased confidence and reduced sense of powerlessness (Gurin: 133).

Clearly, "disadvantaged" includes far more than disadvantaged blacks. In 1968, for example, more than twice as many (3.3 million vs. 1.5 million) white as nonwhite families earned less than the Social Security Administration's definition of a low income ($4,444 for a four person nonfarm family headed by a man). In terms of the probability of a family being poor, however, the incidence of black poverty is three and one-half times that of white poverty--29 percent vs. eight percent in 1968 (USDL, *Manpower Report*, 1970: 120-3).[35] Nor can the poverty of blacks be accounted for simply through the causes of white poverty. If one controls for some of the serious causes of poverty (region, social origin, education, and career beginning),

> The chances of occupational achievement of Negroes are still considerably inferior to those of whites . . . The multiple handicaps associated with being an American Negro are cumulative in their deleterious consequences for a man's career.
>
> . . . It may well be that ethnic discrimination is at the root of such cumulative adverse effects on careers and that without discrimination there is no vicious cycle of poverty. (Blau and Duncan: 404-6)

This evidence--of a high incidence of poverty among blacks and the fact that race itself and its adjunct discrimination appear to be causal--provides a strong argument for providing extra support to courses effective in alleviating poverty in general, and, especially, black poverty.

Although the question of "what works for which children under what specific conditions" is not resolved, (Edmond Gordon: 9) follow-up information should provide strong clues to the effectiveness of various curricula. Controlling the follow-up data for aptitudes and socioeconomic backgrounds should, after cost considerations are made, begin to more effectively orient the vocational education curricula toward the needs of the disadvantaged. As

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[35]This *Manpower Report* also notes high school graduate (not enrolled in college in October of the year at graduation, 1968) unemployment rates of 12 percent for whites and 24 percent for nonwhites (p. 254). A more detailed report indicates some even more extreme regional black-white differentials: for both sexes, 16-19 years, the 1968 employment rate for whites in Ohio, for example, was 12 percent and for nonwhites 39 percent (Schwab: 5). In the first quarter of 1971 the unemployment rate for youth 16-19 years in urban poverty neighborhoods was 17 percent for whites and 41 percent for nonwhites (U.S. Department of Labor, "The Unemployment Situation in Urban Poverty Neighborhoods").

indicated above, a number of programs still train blacks and other disadvantaged for low skill and wage acceptions, and, therefore, before a program can be considered "effectively serving the disadvantaged," it should not only have a substantial proportion enrolled, but those disadvantaged who graduate should find they experience relatively successful entry into the labor force--not just employment, but relatively well paying and/or satisfying employment.

That education may play an important role in the battle to break the vicious cycle of poverty is generally agreed. That its role should not be exaggerated is also clear:

> The educational strategy for poverty reduction suffers from four major limitations: the strategy neglects many poor people; its goals are difficult to achieve, requiring a radical redistribution of resources and first-rate staffs; the strategy is only partially effective for those youths who do obtain education because discrimination and other factors intervene between education and income; and its heavy emphasis on education unanticipatedly damages individuals and society by constricting alternative channels of occupational mobility and by restricting the pluralism of social values. (Miller and Roby: 5-6)

That this discrimination and restriction of mobility may also infect the educational system is reflected in the 1967 case of Hobson versus Hansen (Hobson). In this case the Washington, D.C. tracking system--which separated the honors, college preparatory, and vocational curricula--was found to be

> unlawful discrimination against those students whose educational opportunities are being limited on the erroneous assumption that they are capable of accepting no more. (Hobson: 514)

The case pointed out that

> rather than being classified according to ability to learn, these students are in reality being classified according to their socioeconomic or racial status, or--more precisely--according to environmental and psychological factors which have nothing to do with innate ability. (Hobson: 514)

U.S. District Court Judge J. Skelly Wright

> held that Superintendent and Board, in operation of public school systems in District of Columbia, unconstitutionally deprived Negro and poor public school

> children of their right to equal educational opportunity with white and more affluent public school children. (Hobson: 401)

Clearly, this is a danger in vocational education, and the National Advisory Council's recognition of these problems is reflected in their quote at the start of this section.

Summary

A high percentage enrollment of black or other disadvantaged students in a program is not in and of itself a good thing. If that program is sought voluntarily by the disadvantaged students and also provides them satisfying post-high school employment, then, of course, it is highly desirable.

The importance of providing such improved labor market entry options to blacks particularly has been discussed above, the evidence being basically that even when you examine two groups, one black and one white, with similar regions, social origins, education, and career beginnings, the probable occupational success of the black group is "still considerably inferior" to that of the white.

Careful analysis and utilization of well-designed follow-up information could contribute significantly to the improved labor market success of the disadvantaged. Care must be taken, however, to assure that enrollment is voluntary rather than the consequence of tracking or a situation in which the program might be viewed as merely the "lesser of evils." Through careful consideration of the needs of the disadvantaged and careful planning of corresponding programs, vocational education can play an important role--and in some cases has played--in alleviating the poverty cycle.

PROGRAM COST

Costs of vocational education programs clearly must be an important criterion for program evaluation. The cost criterion is important not to assure that only the least expensive programs should be funded, but rather to remind planners that when an expensive program is supported, there should be reason (if not hard data) to believe that the benefits are worth the costs. Funding of an expensive program presumably will improve the probability of labor market success for its graduates, but if the supply of training funds is limited, it improves the prospects of those graduates at the cost or resources available to other trainees, so that either the number of other trainees or the quality of their training will have to be reduced.

The foregoing rationale for incorporating costs into the planning process requires elaboration in terms of the way funds at the disposal of the state are allocated to schools. For general education, state funds are distributed to schools on the basis of average daily attendance or membership. Funds which may be used only for vocational education are based on the amount of vocational education offered (generally, as measured by full-time equivalent staff load or student hours) and the "excess cost" of vocational education. This "excess cost" of vocational education is measured in various ways, depending on the state. Among the costs against which the local educational agency's per pupil cost of vocational education are compared are the (1) state's per pupil foundation program amount, (2) state average per pupil cost of education--reported most frequently in the National Educational Finance Project survey, (3) state's average per pupil cost of vocational education, and (4) local educational agency's per pupil cost of education (Lindman: 74). Consequently, the above reference to limited training funds refers to the state's funds for vocational education. Whereas local funds, then, are a function of enrollments in vocational education, state funds are not; the latter may be conceptualized more as a lump sum (in a given year) than is true for local agencies.

The ideal cost data one would have for planning are a far cry from those actually available, and would include both implicit and explicit costs. Explicit costs will be considered here, and implicit costs will be discussed under the section below on benefit-cost analysis. Ideally, one would have data on the cost of training a person of given socioeconomic status and educational aptitude for, say, the brazing occupations by the number of hours devoted to that training and corresponding levels of competence achieved. In other words, it would be useful for the educational planner to know whether to devote two or six courses to preparation for this occupation. The planner could compare his follow-up data to the cost data to see whether the graduates with six courses did significantly better in the labor market than did those with one or two courses. If there were no significant difference in the labor market success--considering other job criteria, say, satisfaction, in addition to the usual index of income--of graduates with more intensive training, then presumably the planner would prefer the less expensive training path so that resources could be allocated elsewhere.

Actual data are, predictably, woefully short of the ideal. Gross kinds of outlays by service area are available, say, outlays of distributive education by state, source of funds (federal versus state and local), and "function"--administration, supervision, teacher education, instruction, research, equipment, guidance and other (USDHEW, *Vocational and Technical Education*). These items may then be compared with enrollments by service area to obtain estimates of outlays by enrollee, but the calculation would be

relatively weak for policy purposes. The enrollee data, however, may reflect, depending on the locality, course enrollment (thereby double counting those taking more than one course in, say, technical and industrial) or service areas of concentration, in which the data would reflect the gross occupational groupings rather than specific occupations. For example, it would be very useful to distinguish the costs of training nurse aides from the costs of training LPN's or R.N.'s. The related enrollment data, which are essential to make planning sense out of the cost data, are also weak as a result of failure to make these occupational distinctions. The data also suffer from the fact that they do not reveal either the number or the cost of particular courses taken by the student. Without information of this kind, including follow-up information, planners are severely limited in their ability to conduct rational, data based, programmatic planning.

Attempts have been made to rectify this data gap (Swanson; Morsch; Anderson). Generally, the results reflect higher costs for vocational programs than general or academic programs, with there being considerable variation between the vocational programs. A study of junior colleges, for example, found the ratio of annual costs of full-time equivalent vocational students by curriculum to full-time equivalent liberal arts or transfer students to be as follows:

RATIOS OF JUNIOR COLLEGE VOCATIONAL TO LIBERAL ARTS OR TRANSFER CURRICULAR COSTS

Applied Arts	1.76
Engineering Technology	1.95
Business and Office Occupations	.95
Health and Medical	1.49
Industrial Technical Occupations	1.52
Dietetics and Home Economics Occupations	1.21
Public Service Occupations	.96

Source: Anderson: 2.

One attempt to develop programmatic costs "under present financial reporting practices in a junior college district and in a unified school district" had these conclusions and recommendations from their experience:

1) Instructional program costs can be developed within the present accounting-reporting system.

2) The process is tedious and time-consuming. Additional help was necessary for a period of several months.

3) The problem is essentially one of locating all records of expenditures and allocating and prorating these expenditures to specific programs of instruction.

4) Extensive knowledge of the nature of each instructional program is necessary in order to make the required judgments. This need can be met only with the careful assistance of many personnel from the accounting, instructional and administrative staffs.

5) The accuracy of the results depends upon the competence of judgment of the individuals involved and upon the careful and insightful attention of the Study staff.

6) This type of accounting analysis can produce a wide range of information and can be organized to give the information in a form which will contribute most directly to the needs of the decision-making process.

7) The accounting practice which would contribute most to the accuracy and the efficiency of the costing process is the distribution or proration of the various expenditures to specific instructional programs at the time the expenditures are made and by persons who know most about the services, materials, facilities, etc.

8) The accounting practice should require that the allocations and prorations of expenditures be recorded for electronic data processing (Swanson: 40-41).

That most school systems do not have complete programmatic cost data on hand is quite clear. In the absence of such data and, simultaneously, in the face of the importance of including the cost criterion in the appraisal of programs, there are several alternatives open to the school. First, the planner might rank the costliness of programs on the basis of the experienced intuition of those closely associated with the school system's budgetary process, those most likely to be aware of relative costs in spite of the lack of formally organized data. Second, the school system might use cost data rigorously compiled on a programmatic basis for other school systems, not assuming that the absolute level of costs were similar but rather that relative costs were approximately the same. A third alternative, short of installing a programmatic costing system in each school, would be for the state department of education to sample programmatic costs throughout the state and then have the schools adopt the relative costs revealed in the sample when appraising a program's strengths and weaknesses. It is hoped, however, particularly with the capacities of automated data processing, that all school systems will eventually develop their own programmatic cost data, which would enable more accurate appraisal of programs in view of varying program design and effectiveness within the state.

Finally, the minimum that each school system should do would be to give consideration to the kind of factors that would suggest costs being relatively prohibitive under one institutional setting--in-plant or in-school--rather than another. For example, providing all training for semitrailer drivers on-the-road could lead to substantial traffic tie-ups and injuries, and, therefore, because of the high cost of providing all training for such positions on-the-job, some training prior to job assignment would appear mandatory. Physicians and secretaries would similarly appear to require their training prior to assignment to their job. Many assembly line jobs, however, would not appear to require training, prior to their job assignment, as their training might easily be provided on-the-job and involve very few trainees in the performance of any particular set of tasks so that establishment of such specialized classes might result in enrollment so small as to make them inefficient.

Among the considerations, then, determining the relative costs of training on-the-job or in-the-school are the following: (1) Is it awkward or expensive to provide competent instructional personnel at the typical worksite? (2) Might lack of training prior to assignment to the workplace risk the lives and safety of others? (3) Does the job require broad theoretical background understanding? (4) Would the on-the-job learning by one staff member greatly impede the productivity of others? (5) Would the duplication of the worksite--in terms of equipment or other features--in the classroom be prohibitively expensive? (6) Could the course be taught with substantially less expense on a cooperative basis, to reap the benefits of the worksite experience and equipment as well as the formal institutional instruction? Consideration of these questions should give the planner a rough approximation of the efficiency of whether to offer a course at all in an academic or institutional environment, or possibly, some insight into whether it would be possible to efficiently weld the virtues of institutional training with on-the-job instruction through cooperative work experience (Evans, 1969; Mangum, 1968).

Summary

Costs of a vocational education program are important not because they should always be kept to a minimum but rather because it is important to know the least expensive means through which a specific goal (e.g., test scores of 100 for a given quality of student) may be achieved. Cost information is important when educational resources are limited (as they are so severely today), basically to enable the inclusion of as many students as possible in programs of given quality. Because of the lack of well organized cost information, this report urges increased efforts in its collection and analysis, followed by the careful inclusion of this information in the planning process.

BENEFIT-COST ANALYSIS

Benefit-cost analysis--or its other variously labeled brethren, including systems analysis, net rate of return analysis, planning-programming-budgeting (PPB), etc.--when used in the planning process is basically (1) the process of examining of a system's goals and specific objectives, (2) consideration of known alternative means of achieving those goals, (3) estimation of all costs for each alternate method, (4) estimation of all benefits for alternate methods, (5) discounting both costs and benefits to determine their present discounted values, and (6) identification of those projects or programs with the most favorable relationship between benefits and costs (Stromsdorfer, forthcoming).

The benefit-cost criterion for program evaluation--if sufficiently rigorous and comprehensive analyses exist--would, of course, eliminate the need for individually examining the other criteria. A sound benefit-cost analysis will consider not only the implicit and explicit monetary costs and returns to programs but also the non-monetary benefits and costs as well. In other words, a complete cost-benefit or cost-effectiveness analysis will consider not only implicit costs such as wages foregone by the student while he is in school, but also the specific curriculum's impact on wages earned, job satisfaction, net employment, and other variables such as academic achievement and socialization.

When used in simplistic fashion, even economists have deep doubts about the utility of cost-benefit analyses.

> . . . To weigh on a pecuniary scale whether the benefits are equal to the costs, or to calculate what constitutes the rate of return, of an investment in democratic government, racial nondiscrimination, a healthy human environment, and let me include education as well, is to look at all values through money-colored glasses . . . (Chamberlain: 6-7)

These considerations, that there are important non-monetary benefits involved, simply underscore the need--not to do away with evaluation--but rather to make certain that the nonpecuniary results are given important weights[36] (Williams; Ferman).

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[36]Williams has pointed out that the problems of (1) impact on lifetime earnings (as opposed to first year earnings) and (2) trainee self-selectivity may require methodological coordination or agreements among evaluators. Ferman has noted that a Hawthorne Effect, social-Heisenberg principle, or feedback effect may inhibit pure evaluation, because the evaluation itself affects the outcome of the process.

When resources for cost-benefit or cost-effectiveness studies are available, it is recommended that they be undertaken, assuming that all dimensions--social, psychological, and economic--are considered. As such analyses are expensive, it is suggested that they be undertaken in depth only on a carefully selected sample basis. Follow-up data--on a very low cost basis, such as automated post-cards or mark sensing questionnaires--might be collected universally, so that programs differing in efficiency from the in-depth sample might be identified, and also studied in-depth to determine their characteristics contributing to unusual expense, saving, or effectiveness.

Summary

As indicated above, if thorough benefit-cost analyses were available to all vocational education planners, those analyses would eliminate the need for separate consideration of the above criteria. Such hypothetically thorough benefit-cost studies would already have included consideration of the above criteria. Consequently, planning decisions could be made on the basis of the benefit-cost criterion above. It is in the absence of such comprehensive analyses that this volume suggests separate criteria and alternative techniques for consideration in the planning process.

CHAPTER IV

PLANNING WITH MANPOWER CRITERIA[1]

PLANNING AS A PROCESS

Planning may be looked at from various points of view. At one extreme is the relatively static idea that "planning is the process of preparing a plan." An alternative to this goal of preparing a document would be the more dynamic concept that "planning is the institutionalization of a change process responsive to environmental needs" (Smilansky: 7-11). The latter, which includes within its bailiwick the former, is the concept which will be dealt with here. The basic difference between the two concepts is that the latter considers not only the process of preparing a rational plan document but also the implementation of that plan. Consequently, a few words will be said about developing a favorable environment for planning prior to the discussion of some techniques for preparing a plan.

INSTITUTIONALIZATION OF CONTROLLED CHANGE

To the extent that the organization or system within which planning takes place is so rigid that it will not or cannot respond to the planners' directives, planning becomes irrelevant.

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[1]Although this document was originally planned for state level vocational education planning, much of the discussion--such as the curricular priority matrix, resource allocation, and institutionalization of controlled change--is of more general applicability and relevant to planning at all levels.

Economists are quick to point out, but educators less so, that the sine qua non for meaningful manpower and vocational education planning is the maintenance of reasonably full employment, without which careful manpower planning is purposeless. Without such aggregate economic policies, the most carefully developed skills may lie dormant for extended periods. The last 30 years, however, seem to support economists' claims that--Congress and the Executive willing--deep and prolonged depressions appear to be a thing of the past.

An example of this rigidity has already been related above:[2] the state where a widespread need for bricklayers is known but vocational education has refused to respond to this need. Perhaps the most important aspect of planning is the development of a framework within which the system's response to need is probable.

There are a number of ways that controlled, guided, or planned change may be built into a vocational system. First of all, and critical to the entire process, is the necessity for a data collection and analysis system--information analysis pertinent to the appropriate internal and external guidance[3] of the system. Without such information, planning becomes an intuitive process, which may or may not be related to the needs of the real world. A part of this data collection and analysis system would be the development of close administrative ties with informed agencies and individuals in the relevant planning area: such agencies may include the employment service, manpower administration, university department of economics and education, chambers and departments of commerce, development departments, and Comprehensive Area Manpower Planning System (CAMPS) committees. Other important parts of the information system would be the development--for the college preparatory as well as the vocational component of the educational system--of follow-up and internal program analysis data systems, including program cost accounting systems. Data generated through this system would be useful for (1) the occupational or labor market orientation of students,[4] (2) the determination of student needs, (3) curriculum design, and (4) program planning, all of which are critical to an up-to-date vocational system. The importance of making these data available to all concerned parties--parents, taxpayers, students, legislators

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[2]See, in Chapter I, the section "Why Manpower Criteria?"

[3]By "internal" and "external" guidance, reference is made to internal and external authority, such as, in the internal authority case, the vocational education agency itself administering and budgeting funds for distributive education at the cost of technical and industrial resources, and in the external authority case, a more comprehensive agency (at the federal level, say, the Office of Management and Budget or the Department of Health, Education and Welfare) budgeting funds for vocational education rather than intensive academic programs or roads, or the control exerted from extra-governmental sources by refusal of students to enroll in outdated curriculum.

[4]It is assumed that occupational orientation programs should be part of all primary and secondary programs. (See discussion of "Student Interest" in Chapter III.)

and advisory groups cannot be exaggerated. These groups are the clientele to which the program must be accountable and the sources of pressure for its constant revitalization.

In addition to the development of an appropriate information system for program evaluation and administration, a system of management incentives would very likely make a substantial contribution to appropriate change patterns. These incentives might take any of a number of forms: performance contracting, whereby the firm, agency, or institution is rewarded in proportion to the achievement of the students; management rewards for programmatic coincidence with prescribed priorities; and the use of educational vouchers--so that students and parents have the final decentralized control over program determination.[5] The resource allocation strategies discussed below are still another form of management incentive, in that they provide resources only to those existing programs which are successful in achieving their objectives or to new programs designed to meet high priority needs and objectives.

While the information and incentive systems may help minimize the vocational system's rigidity due, respectively, to the naivete of vocational education's clientele (e.g., with respect to manpower trends) and internal fund misallocation, cooperative education and individualized instruction may serve to alleviate rigidities due to expensive capital equipment and tenured but outdated instructors. To elaborate briefly, there are two additional forms of institutional rigidity built into the system. First, the purchase or even acceptance of a gift of expensive capital equipment obligates a school, or school system to operate programs (say, machine shop) for a substantial period in order to justify the expenditure, even after the equipment may be outdated. A second additional form of rigidity is that stemming from tenured personnel and the reluctance of administrators to implement policies resulting in high turnover of staff. The net result of these (and possibly other factors), is that the school curricula appear to lag behind the techniques of industry. A school system's long term commitment, then, to relatively fixed forms of human and

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[5] If youth prefer other curricula or subsidized on-the-job training, and use their state supplied vouchers to support these alternatives, less attractive programs are not funded (Jencks, 1970; Friedman: 89).

The Office of Economic Opportunity has granted $324,830 to the Center for the Study of Public Policy in Cambridge, Massachusetts for an examination of the voucher system. Their preliminary report indicates the voucher should be (1) equal to the child's per capita share of public educational funds, and (2) increased in the case of disadvantaged youth (*Manpower Information Service*, 7/15/70).

physical capital complicate its capacity to respond to changing training priorities.

Cooperative vocational education is reputed to avoid these two problems by using in-plant equipment and instruction by industrial personnel well acquainted with current techniques. "Co-op" programs also help avoid the tenure problem because the decision to change occupational priorities simply means the training coordinator finds different kinds of work experiences and sees to it that the students' in-school education provides the "academic" skills he will need on the job (Evans, 1969). Individualized modular instruction also facilitates flexibility because, first, as components of a technology change, an entire curriculum need not be abandoned, merely those portions which have been outdated, and second, the student may select only those curricular segments relating to his particular career interests.

The above proposals for

1) improved data collection (e.g., labor market, follow-up, and programmatic cost) and analysis systems;

2) provision of this data to planners, concerned citizen groups, and vocational education clientele (students, parents, and industry);

3) close administrative ties with allied manpower and planning agencies;

4) managerial incentives;

5) expansion of cooperative (integrated work experience) education; and

6) increasingly individualized instruction;

are not new propositions, but they do represent concepts so important as to warrant their repetition and promotion here.

RESOURCE ALLOCATION TO PROGRAMS[6]

INTRODUCTION

The problem of allocating given vocational education resources between programs involves several interrelated questions,

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[6]During this discussion, for simplicity's sake, resources will be spoken of in terms of dollars, but it is well recognized that it is rigidities to the expansion or contraction of real resources

among which the following may serve to highlight perspectives on the problem:

1) What are the goals or objectives for which vocational education is held accountable?

2) What proportion of vocational education's resources should each geographic area receive?

3) Which curricula and instructional techniques best achieve the multiple goals established for vocational education?

4) How should the labor market affect the allocation of dollars to curricula?

5) How much should each curriculum receive within geographic areas?

In the following sections, each of these questions will be considered in turn with examples for illustrative purposes.

MULTIPLE GOALS AND GOAL CONFLICTS

As indicated in the previous chapter, the vocational education planner is faced with a broad array of goals in pursuit of which he must design his vocational training program. There is little reason to believe that all of his goals will be mutually consistent in terms of policy implications. Conflict among goals--as well as between the goals and procedural constraints, such as implementation resources--is inevitable. Somewhere in the planning process, implicitly or explicitly, consciously or unconsciously, choice between conflicting goals becomes inevitable, and consequently, rational planning demands explicit delineation of the goal hierarchy. The selection of curricular evaluation criteria--from among criteria such as those discussed in Chapter III--and the implicit or explicit application of weights to these criteria is, in effect, the delineation of a hierarchy of goals.

The potential conflict among goals must be made clear, and to do so an example may be helpful. Two likely goals for a community might be (1) to provide training to help alleviate

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[6]--that is, men, buildings, material and equipment--that constitute the real, or non-monetary barriers to implementing change. Shortages or surpluses of real factors may cause lags in the adjustment of real resources even when monetary problems are solved.

poverty, and (2) to provide training for the largest possible number of students. However, if it is necessary to provide disadvantaged students with pre-training or compensatory skills, the costs of training the disadvantaged may be greater, per capita, than the costs of training those with middle-class backgrounds. Thus, if resources are not available for training all potential trainees, the higher per capita costs of training the disadvantaged may result in a sacrifice in the total number being trained.

If the planner is unclear as to the real objectives of the training system, in the eyes of the authority to whom the planner is responsible (say, the state board of education), or if these objectives are changed, then his plan, although perfectly consistent with one goal hierarchy, may either be cast aside as useless or result in a disastrous audit when the system faces accountability. To avoid irrelevant planning, then, it would be highly useful for the planning agency to take significant steps to determine the true goal hierarchy of the authorities to whom the agency is accountable. Such explicit delineation of goals, objectives, and their relative weights might take the form of either a well-designed questionnaire or carefully conducted interviews, in which the respondents are clearly aware of the intent of the interviews and consequences of their responses. Given this goal priority information, the planner is then able to begin designing his resource allocation strategy.[7]

RESOURCE ALLOCATION TO SUB-STATE REGIONS

Vocational education planners at the state level have two basic kinds of dollar resource allocation decisions to make: the geographic allocation to subregions of the state (i.e., local education agencies [LEA's] or groups of LEA's), and the allocation of resources to curricula within the subregions, the latter being a responsibility which they generally relegate to the local decision-makers. The geographic decision will be examined briefly here, followed in the next section by a more extensive consideration of the curricular allocation problem within the sub-state districts, once the geographic appropriations have been made.

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[7] One educational planner has underscored the importance of planning criteria: "Until there is far more evidence collected on the problem of criteria in education, and until observation of the criteria yield measurements of attainment that can be related to input and cost measures, the best planning models will be ignoring the fundamental problems of education and training" (Davis: 365).

The U.S. Office of Education has required that states distribute their federal vocational education funds to local education planning agencies through a system reflecting (1) manpower needs, (2) vocational education needs, (3) relative ability of the district to pay, and (4) excess costs. The geographic allocation strategy suggested below includes all but the last of these. The latter is not included explicitly here for several reasons. The first reason is that good program cost data for geographic areas is very scarce. Other reasons for not explicitly including the excess cost criterion hinge around the fact that there are various explanations for differing vocation l program costs, and the authors of this report are unaware of anyone who has analyzed, provided a methodology for quantifying, or actually quantified the contributions of each of these causes of regional differentials (Lindman: 74-5). Costs of vocational programs may vary, for example, because of differences in the structure and quality of vocational offerings: districts emphasizing expensive programs, e.g., machine shop, would be expected to have higher costs than districts emphasizing inexpensive programs, e.g., distributive education. Also, the cost of living, land, equipment, and/or buildings may differ from region to region within a state. Or a district may have less legitimate reasons for high costs, such as simply wasting funds on underutilized plant, personnel, or equipment. Some of these causes for higher costs would warrant, other things being equal, higher appropriations for a school district, while other causes of high costs would call for reduced appropriations for a school district. To the extent that such causes of cost differentials can be quantified, it is recommended that excess costs be included in the allocation process. This report, however, does not explicitly deal with cost differentials in the geographic allocation process for the above reasons. The differential costs of vocational education relative to general education are, on the other hand, considered in the planning processes below, as discussed under "Dollar Allocations and the Labor Market" and "On a Low Cost-Maximum Coverage/Labor Market Success Strategy."

Of the 13 states specifying their geographic allocation criteria and analyzed by the National Education Finance Project (Lindman: 69-72), nine used pupil counts in determining the allocation of funds to LEA's. This criterion, like others such as the number of high school students upon graduation entering the labor force (rather than homemaking or post-secondary education) and the number of unemployed adults, bears only the weakest relationship to the real need of an area for vocational education funding.

Pupil or population counts (without their incorporation into measures of unemployment) are clearly misleading because they do not indicate the need for funds based on any index of labor market trauma or academic shortfall. The same is true of other criteria such as the number of high school students going into vocations:

many successfully enter vocations without vocational education per se. In the case of adult unemployment, many of these may already have acquired skills in their former jobs and require mobility, job search and counseling, or legal (indiscrimination cases) assistance rather than vocational education. Some netting out of these from the unemployed should be undertaken before an assessment of the number of unemployed adults who do need vocational education can be made.

The problem of identifying the geographical distribution of "vocational education needs" is typified in the proud proclamations of various vocational educators that their students would have made good even without vocational education! The obvious question then is, did their students really "need" vocational education? Why not give the resources to someone who needs them and would not otherwise have made good? Vocational education needs, for the purpose of this report, then, are assumed identical to manpower needs.

As a result of these problems, this report suggests an alternative geographic allocation strategy based on information specific to the particular labor market entered by the vocational education graduate or dropout. This strategy, then, is based on information that could be collected without exorbitant cost to the school personnel, data that are already used, or which also would be useful for other planning and evaluation purposes.

The geographic allocation strategy below does not allocate funds simply according to age-specific unemployment rates because it recognizes (1) that vocational education may be preventing unemployment through its current program, (2) that to allocate future resources according to unemployment rates may result in higher unemployment rates in those areas currently enjoying low unemployment rates due to the vocational programs, (3) not all economic problems are reflected in the unemployment rate--low incomes are equally important, (4) there are real, psychic, and administrative costs inherent in massive reallocations of funds, and (5) there are other important criteria that must be included in the process.

Six criteria are suggested here for the geographic distribution of state and federal vocational education monies:

1) the geographic distribution of the age-specific unemployment;

2) the wages earned by the relevant population when they have entered the labor force;

3) the pattern of existing vocational education programs that are to be considered for future funding: the pattern

of continued programs being based upon the estimated impact of the programs on goal and objective indices, say, the academic achievement and/or labor market success of the graduates;

4) a minimum acceptable level of program impact upon specified goals and objectives;

5) the interest of potential clientele in enrolling in vocational education programs; and

6) relative ability of districts to finance vocational education from their own resources, as reflected in the per capita income of the district.

Given these criteria, then, secondary vocational education funds would be allocated geographically according to the following process:

STEP I: Determine the current distribution of vocational education funds by sub-state planning region;

STEP II: Determine, via some evaluation scheme, such as cost-effectiveness analysis or the curricular priority matrix suggested below, any programs which are not meeting established impact standards (in terms of the goals of the vocational education system) and which consequently will be eliminated in the next planning cycle;

STEP III: Assuming sufficient funds are available, continue funding of residual programs at current funding levels; if inadequate funding is available, or more funds are needed to start new and critical programs, apply more stringent evaluation standards to existing programs;

STEP IV: Sum the funds available through programs eliminated in Step II and funds available due to any expansion in the overall availability of federal and/or state vocational education funds;

STEP V: Allocate the funds available through Step IV to sub-state planning districts according to the following formula (constrained, of course, for each local area by the number of students willing to enroll in proposed new programs):

$$\text{LEA RESIDUAL FUNDS} = \left(\frac{\text{LEA Need Index}}{\text{Sum of LEA need Indices for State}}\right) \times \text{Total State Residual Vocational Education Funds,}$$

where:

$$\text{LEA NEED INDEX} = \text{LEA Age-Specific Follow-up Rate of Unemployment} \times \text{LEA Age-Specific Population} \times \frac{\text{Median State Age-Specific Follow-Up Wage Rate}}{\text{Median LEA Age-Specific Follow-Up Wage Rate}} \times \frac{\text{State Per Capita Income}}{\text{LEA Per Capita Income}}$$

Concepts incorporated in the above equation might be defined for secondary vocational education planning as follows:

LEA Residual Funds: The funds to be allocated to the local vocational education planning areas out of those federal and state funds available through the elimination of former programs or budgetary increases.

LEA Age-Specific Follow-Up Unemployment Rate: The unemployment rate of young people, say, 18-21, who have not gone on to higher education, as estimated by the follow-up survey of former students (vocational, general, and college preparatory), from the local vocational education planning area.

LEA Age-Specific Population: In this allocation of secondary funds, that group currently in the educational system (total not likely to enter the college preparatory program, not just vocational), who will be eligible for vocational education during the period for which plans are being devised, and who might experience similar unemployment as their predecessors unless better training or education is provided: e.g., the maximum potential vocational education clientele.

Median State (or LEA) Age-Specific Follow-Up Wage Rate: The median wage estimated for the respective area (state and local) through the follow-up survey of all former students who entered the labor market soon after departing from high school, vocational, general, and college preparatory.

State Residual Vocational Education Funds: Funds remaining for disposition by the state agency after funding those present programs that will continue to be funded on through the planning period, and after funding state overhead and administrative expenses.

State (or LEA) Per Capita Income: The average or per capita income of the population in the state of local education planning area.

The phrase "age-specific" is used frequently in the formula to reflect the fact that the need for vocational education funds for secondary and post-secondary programs, which constitute by far the largest portion of costs, should be determined not by overall unemployment or income indices, but by data relating to the specific labor market entry problems of young people. One of the big problems in using existing state employment service 203 form estimates of youth unemployment, for example, rather than estimates of unemployment via student follow-ups, is that the insured unemployed covered by the data may not adequately represent the relevant population. For example, in a study of three cities, Denver, Detroit, and Milwaukee, the insured unemployed represented, on the average, only 45 percent of total unemployment, the percent in Denver falling to 20 percent (Cohen: 31). As one must already have been employed to be eligible for insured unemployment benefits, one might assume the youth to be underrepresented in insured unemployment data, with coverage in the data likely to vary by region as well as age-group. Thus, a complete student follow-up is the instrument recommended for determining such unemployment. For similar reasons the follow-up survey is the source of information (median wage) used to reflect the degree of labor market success or difficulty experienced by those who do manage to obtain and hold jobs.

The index of relative ability to pay utilized above is per capita income rather than taxes paid or property tax assessed valuation. The reasons for this are, first, taxes paid may be less than the potential for paying taxes, second, assessed property values are an inaccurate index of ability to pay (Benson: 168-9), and finally, there is some question regarding the legality of real estate taxes as the financial base for education.[8]

The basic rationale, then, for the formula is that it is an attempt to allocate vocational resources not by the size of the population but the need of that population for assistance in labor market entry and the ability of that population to finance such training. The roles of the number of age-specific unemployed

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[8]The California Supreme Court has ruled that if the trial court, to which the Supreme Court has returned the case of Brown vs. Board of Education, "determines the facts are as alleged," the trial court must find the financing of education through the property tax unconstitutional. The California court did not prescribe solutions, but seems to have left these to the state legislature. It would apparently prohibit variations in spending on a youth's education due to geography but not due to educational needs. Since the California decision, more than 20 challenges to school finance legislation have been filed. In Minnesota, the federal district court has found that state's system of school finance unconstitutional (Wise; *Ohio Schools*).

in the local area (first two factors above) and the ratio of state to local median wage would be to provide state funds in proportion to indices of the extent of labor market trauma experienced in the local areas as opposed to the state as a whole. The role of the ratio of state to local per capita income would be, of course, to give funding emphasis to less affluent districts.

An example, to illustrate the role of unemployment, population, and wages, in geographic resource allocation, is given below:

	YOUTH UNEMPLOYMENT RATE	AGE-SPECIFIC POPULATION	FOLLOW-UP MEDIAN WAGE	PER CAPITA INCOME
LEA "A"	20%	100	$2.00	$2000
LEA "B"	10%	400	$4.00	$3000
STATE (A and B)	12%	500	$3.60	$2800

$$\text{LEA "A's" NEED INDEX} = .20 \times 100 \times \frac{3.60}{2.00} \times \frac{2800}{2000} = 50.4$$

$$\text{LEA "B's" NEED INDEX} = .10 \times 400 \times \frac{3.60}{4.00} \times \frac{2800}{3000} = 33.6$$

When total state residual funds equal $1000,

$$\text{LEA "A's" RESIDUAL FUNDS} = \frac{50.4}{84.0} \times \$1000 = \$600$$

$$\text{LEA "B's" RESIDUAL FUNDS} = \frac{33.6}{84.0} \times \$1000 = \$400$$

In this example, in spite of the fact that area B has four times the population of area A, area A receives the majority of the funds due to its compounding economic difficulties: A, relative to B, has twice the youth unemployment rate, its youth's entry wages were only half "B's", and its ability to support vocational education (as reflected in per capita income), was only two-thirds that of B. This does not, of course, indicate the total funding picture, for B may still be receiving substantially more funds than A due to the earlier commitment of vocational education funds in B to relatively effective programs. The earlier funding of vocational education programs in B may, in fact, be partially responsible for the fact its youth unemployment rate is relatively low. If the evaluative criteria to determine funding continuation, a la Step II, are rigorous, based on impact upon academic, social, or labor market need, and effectively applied, this would help to assure the distribution not only of "residual

funds" but also continuation funds in accord with the need for vocational education's impact upon the state's social, educational, and/or economic problems. Whether the above allocation strategy is conservative or reformist would, of course, depend on the criteria used to appraise programs in Step II above.

The above procedure, then, indicates the kind of analysis that might be used to distribute vocational education secondary education funds according to the labor market difficulties of youth. One might use a similar analysis to allocate post-secondary and adult education funds, recognizing that the populations differ and that consequently the wage and unemployment data will differ. In the case of adult needs for vocational education, however, one must remember to net out those requiring labor market assistance other than training. Many of the adults will, for example, already have acquired job skills, and their needs will be other than training. To the extent that the cause of their unemployment is inadequate aggregate demand, or a need for assistance in the forms of job availability information, counseling, mobility subsidies, or legal aid (where discrimination precludes job openings), the vocational education funds for a region should be reduced.

CURRICULAR PRIORITY DETERMINATION

Having identified the goals (and their weights) against which the system will be held accountable, the planner must develop a means for integrating these goals, objectives, and weights into the planning process. A means for integrating several criteria, such as those discussed in Chapter III, into a "Curricular Priority Matrix" is illustrated on the following page.[9] Generally, the matrix would indicate high priority for those programs which were relatively successful in pursuing the system's goals. The set of criteria to be used along the horizontal axis will, of course, have to be selected by the planning agency, or imposed upon or recommended to them by superior authorities, such as state or local boards or advisory committees.

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[9]Crane and Abt have devised another "curriculum evaluation model," which its authors recognize is "susceptible as well to human error" and requires "appropriate adjustment in the weighings made by the evaluator." The Pennsylvania study also developed a priority index for curricula, and has already been commented on in a footnote to the mobility discussion in Chapter II (Arnold: Chapter IV).

CURRICULAR PRIORITY MATRIX[1]
(hypothetical, for secondary school programs)[2]

CURRICULUM-OCCUPATION:	PRIORITY CRITERIA: 3	Net Openings 4	Student Interest 5	Academic Performance	Entry Wages	Seniority Wage	Job Satisfaction	Entry Requirements	Curricular Cost 6	Serving Disadvantaged (Weight = 2) 7	CURRICULAR PRIORITY INDEX	RANK PRIORITY ORDER
Nurse, Registered	1*	1	3	3	2	3	0	1	3x2=6	(20)**	x***
Licensed Practical Nurse	1	1	2	2	1	2	3	2	2x2=4	18	4
Nurse Aide	1	0	1	1	0	0	0	3	1x2=2	(8)	x
Typist	1	1	2	2	1	2	3	3	2x2=4	19	3
Machinist: Institutional	1	1	3	2	3	2	2	0	3x2=6	(20)	x
Machinist: Coop Ed	1	1	3	2	3	2	2	3	3x2=6	23	1
Carpenter	0	1	2	3	3	2	1	1	2x2=4	(17)	x
Computer Operator	1	1	3	3	3	3	1	1	3x2=6	22	2

Footnotes to the table follow the discussion of the Calculation of Cell Scores.

*GENERAL RANKING OF CELL SCORES:[8]
0 - inappropriate for vocational education
1 - low priority score
2 - moderate priority score
3 - high priority score

**Parentheses may be used to indicate that according to one criterion or more, the program is inappropriate for vocational education.

***Scored inappropriate for secondary vocational education under one or more criteria.

Calculation of Cell Scores for the Curricular Priority Matrix

Net Openings

0 - Insufficient training related openings to warrant a vocational education training program.
1 - Training related openings likely to be adequate to absorb at least the minimum number of graduates entering training related occupations deemed necessary before offering such a curricular program.

Student Interest

0 - Inadequate to warrant a program.
1 - Sufficient numbers of students will enroll to warrant a program.

Academic Performance

0 - Controlling for student aptitudes and attitudes, the academic skill effects of this program appear sufficiently injurious to disqualify it for financial support.
1 - The program does not impede academic skill development.
2 - Students, controlling for aptitudes and attitudes, appear somewhat stimulated to improve academic performance.
3 - The program, controlling for aptitudes and attitudes, appears to substantially improve academic performance.

Entry Wages

0 - Entry wage is below federal minimum wage.
1 - Low but acceptable entry wages.
2 - Moderate entry wages.
3 - Very good entry.

Ideally, these would be annual earnings from full-time--40 hour week and 52 weeks--labor force participation (not necessarily full-time employment, however) in this occupation. Earnings, wages, and income are used synonymously here. Consequently, unemployment would be reflected in lower earnings over that period.

Seniority Wages

0 - Earnings for graduates from this program after, say, five or 10 years are insignificantly above those of non-vocational graduates of similar aptitudes (or, in the case where that data is not available, insignificantly higher than unskilled labor).
1 - Modest wages, but above untrained and unskilled.
2 - Good earnings.
3 - Very good income.

Job Satisfaction

0 - Very low job satisfaction.
1 - Moderate job satisfaction.
2 - High job satisfaction.
3 - Very high job satisfaction scores.

Entry Requirements

0 - Some entry requirements make the program inappropriate for vocational education at the secondary level (e.g., post-secondary training is required, and secondary related training is not a prerequisite for that post-secondary training, or, the program might be deemed inappropriate for vocational education financial support if there were no training requirements necessary for entry into the occupation and the untrained were as competent as the trained entrants on the job).
1 - Vocational education may be, but is not always, helpful in obtaining a job; other barriers to entry play an important role.
2 - Pre-employment training will probably be helpful in obtaining a job.
3 - Pre-employment training is critical to obtaining a job.

Curriculum Cost

0 - Prohibitive, or very expensive relative to probable benefits to be received by students (i.e., high cost programs may be highly worthwhile if students' benefits are proportionately high).
1 - High cost program (it would be useful not only to compare costs among vocational education programs but also between vocational education and other programs, the general and academic).
2 - Moderate costs.
3 - Very low cost (say, equal to or less than general and academic programs).

Serving Disadvantaged

0 - The program does not provide satisfactory entry level wages or job satisfaction for the disadvantaged.
1 - The program enrolls a reasonable number of the disadvantaged but provides only modest wages and job satisfaction.
2 - The program enrolls a reasonable number of disadvantaged and provides them with good income and job satisfaction.
3 - The program enrolls a reasonable number of the disadvantaged and provides them with outstanding earnings and satisfaction in employment.

The weight of 2 under this criterion is for illustrative purposes only. The actual weight could obviously be more or less, as determined by decision-makers.

NOTES TO CURRICULAR PRIORITY MATRIX:

[1]Separate matrices might be calculated for each clientele grouping--e.g., physically handicapped, retarded, very bright, etc.

The cell scores indicated do not apply to any particular geographic area: some are based on national data, some on the nature of the occupation or training, and some on the intuition or biases of the author. They are hypothetical and for illustrative purposes only. The column weights are strictly hypothetical and should be varied in accord with the community's objectives for vocational education, as the education authority is best able to interpret them. Some communities may wish to add additional columns and/or subtract others.

[2]Secondary program priority rankings may be quite different than post-secondary rankings: e.g., whereas nursing instruction is given a zero "entry" ranking for secondary programs--because one cannot go into the registered nursing profession with simply a secondary preparation--nursing would receive a high entry ranking for post-secondary programs. A similar matrix clearly could be developed for post-secondary program using the same technique. "Secondary" is mentioned here only to underscore the fact that cell scores for post-secondary programs may be quite different.

[3]These criteria have been discussed in more detail in the preceding chapter. The inclusion and exclusion of particular criteria is clearly arbitrary. For example, it could easily be argued that occupational criticality should also be included here, for it cannot easily be argued that wages are universal reflectors of the employer's real total contribution (monetary and non-monetary) to society.

[4]Net openings are scored as either 0 or 1 to indicate that there are or are not sufficient openings to warrant a program, the other criteria (except student interest) then being used to reflect the importance of that program relative to other programs.

[5]Student interest, like net job openings, is classified on a 0 to 1 basis, receiving a zero only if there were inadequate student interest to warrant a program.

[6]Costs may well be a function of the capacity of the program to effectively serve the needs of the disadvantaged. That is, a program which attempts to serve their needs may require special remedial or more intensive programs than those designed to serve

students with average high school literary and mathematical skills. For this reason one may wish to estimate costs either on (1) the assumption that a reasonable percent of the disadvantaged will be served in all programs--this would be in accord with the recommendation of the National Advisory Council that the disadvantaged be retained in the "mainstream" rather than relegated to their own programs, or (2) the assumption that special programs for the disadvantaged will be established and their costs estimated accordingly. Per student costs will, of course, be partially determined by enrollment as well as equipment, material, faculty, etc. costs. (Very low course enrollments lead, of course, to relatively high per student costs.)

This criterion could, like net openings and student interests, be applied in a 0-1 fashion, where programs exceeding some maximum cost simply are not funded. (See the section below on low-cost-maximum coverage strategies.)

[7]The specific weight to be placed on this criterion, like the others, is clearly arbitrary. In support of a somewhat greater emphasis on this criterion are the discussion of the previous chapter as well as the texts of the 1968 Vocational Educational Amendments (P.L. 90-567; Section 123-6B) and the U.S. Office of Education *Regulations for State Plan Programs* (*Vocational Education Amendments of 1968*), Section 102.51-3d.

[8]Whether absolute values of data will receive cell scores of 0, 1, 2, or 3 will, of course, depend upon the conditions of the local community. For example, an entry wage of $2.50 might be considered relatively low in a prosperous metropolis, whereas in a relatively remote depressed area it might be considered good.

One might choose to make the cell scores continuous rather than discrete. This might be done by determining the range between high and low values for that criterion, and determining the portion of the gap covered by the achievement of that curriculum. For example, if the highest average graduate wage for a curriculum were $4.00 and the lowest were $2.00, a curriculum whose graduates averaged $3.00 would receive a cell score, under this continuous scoring system of .5.

As structured in the figure, each criterion but one implicitly receives a weight of one--that is, each criterion (except "Serving Disadvantaged") is assumed of equal importance relative to other criteria.[10] If the planning agency wishes to place particular stress upon a particular criterion, that column could be multiplied by a factor in proportion to the desired emphasis for

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[10]Freeman discusses the problem of which weights to apply to specific objectives (Freeman: 569-72).

that criterion, as is illustrated in the column, "Serving Disadvantaged," which has received a weight of two for illustrative purposes. A similar weighting procedure could similarly have been applied to the other criteria. Wages have actually received a weight of something more than two because they are represented in three criteria, "entry" and "seniority" wages plus their role in determining the cell score for the criteria "Serving Disadvantaged."

At this stage a brief discussion of the curricular priority matrix example might be useful. Considering the curricula-occupations in tabular order, the registered nurse curriculum would be rejected because of its zero under entry requirements. This cell score is due to the fact that registered nurses generally must have at least two years of post-secondary training, and if the index were being developed for post-secondary rather than secondary programs, the nursing curricular index would have been much higher. The cost of the nursing program is assumed substantially more than the LPN program, which is, in turn, assumed substantially more than the aide program, costs increasing directly with complexity.

The LPN program does well relative to the nurse aide program because of better pay, status, and job satisfaction. The nurse aide program is rejected as inappropriate for vocational education funding as they have very little vertical mobility and no real pre-employment training is required.

The row score for typist is relatively high (compared to nurse aide and carpenter) as a result of many openings, the requirement for pre-employment training, relatively attractive working conditions, and considerable student interest in the program. The typing score suffers slightly as a result of little vertical mobility, though this score may be unduly low for those of high aptitude and willing to stay in the labor force to accumulate seniority.

Machinist programs are given two scores to emphasize the fact that there is more than one way to provide training to secondary students, and some approaches may be less expensive than others. If the co-op program not only cuts costs but also provides more up-to-date techniques, as some of its advocates claim, then the entry wage score for the institutional program might also be lower than that for the co-op program.

Carpentry receives a one for entry requirements only because in some areas non-union opportunities are available, otherwise sufficient training might be acquired through the apprenticeship (formal and informal) programs. In this hypothetical case, it is assumed there are insufficient net openings to warrant a carpentry program.

Computer operators might have received a still higher rating if it were not for the fact that they are largely trained on-the-job, though the extent to which this will continue to be true in the future remains to be seen. Depending on the possibilities for teaching students on the school system's own data processing equipment and the development of data processing instructional technology, the score for costs might be raised or lowered.

That the weights for the columns, and consequently the final priority rankings, are arbitrary has been emphasized before. Questionnaires or interviews with those to whom the system is accountable, however, may serve to substantially reduce the extent of the uncertainty. The prime value in such a system for priority determination lies not in the final index for each curriculum but in the analysis of the relative strengths and weaknesses of each program and the explicit recognition of these at the time of decision-making regarding program determination. The summary index for each program should not be looked upon as sacred, but rather as a first index for program priorities. If the planning or administrative agency at any level--state, school district, or school--wishes to deviate from such an ordering of priorities in its program development, it clearly should be allowed to do so, if it provides a sound and EXPLICIT argument for so doing.[11] If such deviations from the index hierarchy become frequent, however, it may imply that goals, criteria, and/or criteria weights must be revised in the light of newly revealed real community preferences.

Basic to the rationale for this approach to planning is the assumption that only by examining programs by specified criteria can one hope to arrive at a more rational planning process and an understanding of that process by relevant clientele, including in that clientele students, taxpayers, governmental budgetary personnel, and legislators. This explicit exposition of the reason for program funding, in terms of both past achievement and future objectives, is critical both to the accountability for past programs as well as garnering of support for future plans. The Curricular Priority Matrix, then, may be considered not simply as a planning instrument but also a program implementation instrument to make clear to the public the potency of each curriculum when weighed against explicit criteria. Underlying this rationale is, of course, the assumption that information about program achievements (in terms of, say, placement and the corresponding wages and job satisfaction of graduates) will be disseminated to those clientele interested in such information. When the public is aware of the successes and failures of alternative programs, it

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[11] Such a delineation of priorities is important at all planning levels, from the federal to local, and thus some form of curricular priority index approach would also be useful at all levels.

is assumed that the pressures they exert upon the school authorities will be additional incentives for program modification.

Subgroup Matrices

It is conceivable that one might develop a separate set of curricular rankings for each of vocational education's clientele: e.g., (1) those of average aptitude; (2) minority group members likely to experience labor market difficulties due to their socioeconomic backgrounds; (3) the mentally retarded; and (4) the physically handicapped. The use of such subgroup curricular priority matrices would reflect the fact that the impact, design, and costs of programs will very likely reflect the clientele to whom programs are addressed. Caution must, however, be used in considering socioeconomically "disadvantaged" minorities as a separate part of the educational community, for such a strategy may lead to the segregation and tracking problems discussed briefly in Chapter III (e.g., Hobson vs. Hansen).

To avoid treating social minorities through such separate tracks, a column such as "Efficacy in Treating the Disadvantaged" in the above matrix is suggested. Presumably, both very small and very large portions of "disadvantaged" in classrooms (relative to the portion of "disadvantaged" in the local community) should be avoided. Or at least, when such situations do occur, care must be taken that the reason for such is the interests of the students rather than the consequence of a segregation-tracking system.

If it is decided that the "disadvantaged" are to be served side by side with the majority, but other subgroups, say, the physically and/or mentally handicapped, should be served separately, then it would be appropriate to develop separate matrices for these groups. When the planners have as a given the funds to be devoted to the training of such specialized clientele, then the matrix would simply determine which curricula would be preferred. If, however, the funds to be devoted to the handicapped were to be determined by the planner, then comparing subgroup matrices may yield some insight, first, regarding the relative effectiveness of dollars spent on different clientele, and, second, some insight into the magnitude of programmatic funding that might be appropriate for each subgroup.

Marginal Analysis

Another reason for separate specific clientele matrices is to provide proxy information for the marginal analysis data sought by the economist. In other words, ideally, the program planner would allocate more dollars to a program (e.g., welding) only when

those dollars could not yield greater benefit in any other program (e.g., nursing or bricklaying). Because researchers have not yet developed data that would enable such sophisticated "marginalist" planning, neither manpower nor vocational education programs are planned or evaluated according to such indices. The use of the subgroup impact information, however, may serve as a rough proxy for the marginal analysis process (Borus and Tash: 31-32).

Another means for assessing the marginal impact of programs is--rather than using simple cell means to determine cell scores--to examine the frequency distribution of individual achievements concerning wages, job satisfaction, etc. The reason for so doing is that a program may be serving some portion of its students very well, but the labor market's limited absorptive capacity for given skills may mean that beyond some limit, additional output from the program simply floods the market with graduates. The cell score then might be the score for some relatively successful portion of the graduates, with a ceiling then being placed on the program at that level.

Still another way to attack the marginalist problems would be to examine the mean cell score for training related as opposed to unrelated placements. This approach would, of course, be more appropriate at the post-secondary level, where there is more commitment to an occupation than is true at the secondary level.

DOLLAR ALLOCATIONS AND THE LABOR MARKET

Two principal means will be suggested in this report for determining, from labor market and other sources of information, the financial resources to be allocated to each curriculum. The first is based on the simple idea of "net training related openings," a concept reflected in state vocational education plans submitted to the U.S. Office of Education. This "net openings" resource allocation strategy simply subtracts "supply" from "demand" (both defined in relatively loose terms, that is, exclusive of the wage factor) to determine net openings, the latter then being the training gap which might be filled by vocational education.

The second means for relating labor market information to vocational education curricular allocations uses wage and job satisfaction information combined with student course preferences as key determinants of the maximum level of program funding. This approach is based upon the fact that information about demand and supply is very spotty and often sadly lacking concerning such critical variables as the quality and quantity of on-the-job training, vertical occupational mobility, and other sources of a particular locale's manpower, such as military returnees, correspondence courses, and geographic mobility. This second approach,

the "labor market success strategy," may be more appropriate at the secondary level than the junior college level, due to the fact that at the secondary level the nature of training provided is far more general than is true at the junior college level. The generality of secondary training makes it more difficult to relate the curriculum to specific skilled occupations than is true at the junior or community college level, post-secondary training being more in-depth in nature and related more directly to specific skilled occupations.

A basic assumption underlying both of these resource allocation strategies is that it is important to have students interested in the subject matter in which they are enrolled. In the "labor market success strategy" student interest is the enrollment ceiling, subject to some minimum degree of labor market success of the graduates. In the "net openings" strategy, the enrollment ceiling would be the number of anticipated training related job openings, unless there were fewer students interested than there were job openings, in which case student curricular preference would again be the enrollment limit. Programs would be funded, however, only in the order depicted by the curricular priority matrix and, as a maximum, to the extent determined by either net openings or student curricular interest, the latter being the ultimate constraint upon funding.

Training Related Placement Strategy

This strategy begins with an analysis of curricular priorities as determined through some means such as the curricular priority matrix discussed earlier in this chapter. This matrix will indicate which programs should receive prior funding. The order in which programs are to be funded, however, does not indicate the the appropriate magnitude of funding for a curriculum.

Numerous vocational education planning documents already contain estimates of "net openings" that are suggestive of appropriate funding levels for service areas, or curricular clusters. In addition to the data and methodological shortcomings of such calculations, (discussed in Chapters II and III) another weakness of such plans is typically that they do not suggest a rationale for providing priorities to one curriculum before another. In other words, simply the knowledge that X openings are anticipated in occupation Y is insufficient information for determining whether resources should be allocated to training for that occupation.

Curricula clearly differ substantially in the incentives and subsequent psychological and economic rewards they offer the student, and curricula should not all be considered equal in the eyes of the planner. Given that--through the use of cost-effectiveness

or benefit analysis, a curricular priority matrix, or some other evaluative technique--some curricula have been determined "more equal" than others, one may then turn to "net openings" and student curricular preference information to determine levels of funding for the relatively high ranked curricula.

The training related placement allocation strategy might, then, take the following form:

1) Order the curricula according to a specified set of criteria and weights;

2) Provide funding to curricula according to this order;

3) Determine the difference between the per student cost of each vocational education curriculum and the general curriculum;

4) Determine the annual expected number of net training related job openings for the curricula;

5) Determine the number of students interested in enrolling in the various curricula;

6) Appropriate no more dollars to curriculum X (in order of their above priority) then the following product:

   a) the difference between that vocational education's per student annual cost and the general curriculum's per student cost times the lesser of

   b) the number of students flowing through the curriculum necessary to produce sufficient graduates to fill the training related openings, or

   c) the number of students preferring the program.

The formula for this training related placement strategy's curricular allocation ceiling would look like this (where, Y = net annual related openings):

$$\begin{pmatrix}\text{Maximum}\\ \text{Appropriation to}\\ \text{Curriculum X}\end{pmatrix} = \begin{pmatrix}\text{Curriculum X's}\\ \text{Extra Cost Per}\\ \text{Student}\end{pmatrix} X \left[\begin{array}{c}\text{lesser}\\ \text{of}\end{array} \left\{ \begin{pmatrix}\text{Number of Students in}\\ \text{Curriculum X to Assure}\\ \text{Y Students Annually}\\ \text{Seeking training Related}\\ \text{Placement}\end{pmatrix} \text{----------OR----------} \begin{pmatrix}\text{Number of Students}\\ \text{Preferring Curriculum X}\end{pmatrix} \right\}\right]$$

A few comments are in order concerning the elements in the calculation:

"Curriculum X" refers to a complete program of vocational preparation for a particular occupation and would include all occupationally specific courses within a school system leading to the preparation of graduates for that occupation; and thus "curriculum X" would include, say, sophomore through senior courses specifically intended to prepare draftsmen but would exclude general courses such as English or mathematics.

"Net openings," (Y) as discussed in Chapters II and III, considers other sources of trained manpower, the demand for such manpower, and whether there is any residual training task left for vocational education after other sources of supply are included.

"Number of students in curriculum X to assure Y students annually seeking training related placement" refers to the fact that the annual output of a set of trained graduates is the consequence of a flow of students through the program over a period of time, some of whom will drop out of school, some of whom will be transfers from other curricula, and some of whom will not graduate for two or more years. It will be necessary to provide funding each year for the entire program flow which is necessary to provide for the annual output of trained manpower: the greater the annual output, the greater the size of the flow necessary to produce that output.[12] The reason "students annually seeking" (training related placements) is used is to avoid the problem that might arise from a historical low training related placement rate being due to the number of students seeking related placements being greater than the number of openings available. If we did not give consideration to whether related placement was sought, use of an empirical low training related placement rate to determine the number of in-program students necessary to yield Y students seeking placements might then result in an excessively large flow of students through the program, and, consequently, the inability of some students to obtain their anticipated related placement.[13]

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[12]Assuming that the instructional technology has not changed: if the training system should become more efficient in producing training related placements, given a set of student inputs--say, through, the reduction of dropouts--then a given flow of students might result in more placements than was formerly the case.

[13]Acceptable reasons for less than 100 percent training related placement of graduates, for example, would include the decision of trained women to postpone their careers and enter the household full-time rather than the labor market, or a change in

"Number of students interested in curriculum X": this is included as an alternative to the previous factor because if there is an insufficient number of interested students flowing through the program to fill the openings, then the use of the previous product would result in superfluous funding of the program (at a level sufficient to support a larger number of students than actually enrolled).[14]

"Curriculum X's extra cost per student": this refers to the fact that per student cost varies according to the curriculum in which they are enrolled, and general curricula are, on the average, less expensive than technical curricula. High equipment and materials costs generally tend to raise the cost of a vocational program as compared to a course in, say, algebra or literature. Even within the vocational schedule, there is considerable variation, the technical programs tending to be more expensive than the business and office occupations.[15] "Extra curricular cost" is here defined as the difference between the cost of a specific vocational program--not "business and office" occupations, which refers to a general service area, but, say, stenography or general clerical--and the general (nonvocational and noncollege preparatory) curriculum. It is assumed, in other words, that sufficient dollars are already available to provide a general education, and that the vocational education financial planner has the problem of providing only sufficient extra dollars to enable the implementation of those priority programs which cost more than the general curriculum. Vocational education funds, then, will not be provided to programs costing less than the general curriculum.

These calculations, then, provide a ceiling on programmatic funding. To completely fund the high priority programs to the limit of their anticipated openings may--given current vocational funding--severely restrict the variety of programs offered in any one school. Such a decision also places great confidence in ones ability to forecast "net openings." If, for example, on-the-job training, output from private training institutions or vertical mobility accounted for a larger portion of total supply then anticipated, leaving fewer net openings than were forecast, much

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[13] the career interest of students near the end of their student careers. Less than 100 percent related entry of those who sought related entry, however, under conditions of national full employment, would imply, under this strategy, a cutback in future curricular funding.

[14] It is assumed that programs will not be funded if student interest is so low as to make the program inefficient due to very small class size.

[15] See the cost discussion in Chapter III.

training might go unutilized following graduation. To fund less than the ceiling on funding would help: (1) avoid these consequences of forecasting errors, (2) avoid the concentration of vocational education's subsidy, and (3) avoid the total cyclical elimination of marginal but acceptable programs when there is budgetary instability.

The precise number of openings that should be funded will have to be determined through other criteria. A state might decide to implement a safety factor by funding only, say 25-50 percent of the net openings of the top priority curricula/occupations. Or, the frequency distribution of, say, wages (via existing area wage surveys) might be examined and funds cut off for that portion of openings below some given level. Establishment of a minimum number of vocational education curricula for schools of given size and funding would be another possibility. The precise technique to be used to cut off funding below the above calculated ceiling level will, of course, have to be determined through experience.

The general objectives of this "Training Related Placement Strategy" are (1) to fill jobs similar to the training received by the graduates, and (2) to fund high priority programs in correspondence with net training related openings in the labor market, or whatever numbers of students are seeking such openings, whichever is the lesser. The fact that graduates from a curriculum might do very well in the labor market even though they may take jobs not directly related to their training--perhaps, as mentioned before, as a result of the fact that the vocational education provided a sufficient motive to remain in school, thereby picking up sufficient generalized skills to enable their labor market success--is overlooked in this strategy.

A slight variation in this strategy, that would utilize the same basic rationale, data, and calculation, would take into consideration the fact that if there is a persistent and substantial shortage in the supply of graduates from a particular program, then other sources of supply for that type of skill will also tend to increase their output of trained manpower at the same time the vocational education system is expanding its training for that occupation. To take into consideration the possibility of simultaneous increases in output from all sources, then, Y, the related openings, might be determined in consideration of the fact that other training sectors will also expand somewhat. If vocational education provides unusually competent and efficient training for that occupation, planners might assume its training responsibilities, as a portion of all training for that occupation, to increase over time.

Labor Market Success Strategy

The second strategy presented here depends less on data external to the vocational education system--such as forecasts, estimates of on-the-job training, community wage, or job openings data that might be supplied by state employment services--and more on follow-up data collected by the vocational or, preferably, the entire school system. This would be the strategy of allocating funds to those programs which produce--after standardizing for socioeconomic and aptitude backgrounds--graduates who experience relative labor market success, measuring success in terms of income as well as job satisfaction. Clearly, other strategies than those relating to labor market success could be elaborated and implemented by the appropriate school authorities, simply by substituting other criteria (e.g., academic performance, or social cohesion) for those of labor market success. Labor market success is elaborated upon here simply because that is the typical rationale used in support of vocational education.

The basic difference between this strategy and the earlier training relatedness strategy is that the labor market success strategy recognizes that the reasons for selecting high school curricula are not always the same as those used in selecting one's career. Consequently the number of slots provided in a curriculum through this strategy is less determined by net job openings than by the student's curricular preference and subsequent labor market success. The timing of the school and labor market decisions, as well as the knowledge bases on which they are made, are quite different, and thus there is no reason to believe or insist that they be consistent. Students select specific vocational curricula for various reasons, only one of which may be that the curriculum represents training which they will later use in their career. Other reasons for curriculum choice include, of course, that one curriculum may be perceived as less difficult than another, or that the chosen set of courses is more interesting--from a short run point of view, such as auto mechanics--than another set that might be more closely related to long run aspirations. One review of theories of vocational development indicated, for example, that "most . . . major theories . . . agree . . . that the average young person does not have sufficient vocational maturity in the ninth or tenth grade . . . to select a particular vocational area for specialization" (Lewis). Students, like the cigarette prone and overweight, not infrequently respond to their short run rather than long run interests.

Nor is it clear that permission to enter courses reflecting short run interests is counter to the high school system's long run objectives. If, for example, enrollment in courses students perceive to be interesting (say, auto mechanics or agriculture) results in fewer dropouts than would occur if the students were forced--through restriction of the number of seats--into less

interesting classes, then retention in school may result in the acquisition of generalized skills (communication and math, for instance) that might not have occurred if the student were not allowed to enter a high preference curriculum. When graduates of a vocational curriculum do experience labor force entry problems, however--as reflected in their follow-ups--then the planner should begin searching, either, for alternative curricula to which to allocate his resources, or for means to modify the existing curricula to enhance the probability of the students' labor market success.

That the use of this approach to planning may lead to indolence relative to curricular improvement is clear. Planners would tend to continually supply resources to a curricular program, so long as its graduates were successful. Thus, the planners would not be urging modification or fund cutoffs unless graduates were earning low incomes or unsatisfied with their jobs, even though possibilities for program improvement may exist. Warning flags to the planner would only appear when relative labor market failure was evident. It may be, however, that the success of the graduates reflects the willingness of program administrators (rather than planners) to be innovative in their evolving curriculum.

Ideally, one would look at which jobs were taken by which students, and then attempt to design the curriculum to make it increasingly attractive to the student as well as to make it increasingly relevant to the skill needs of the labor market. The reason for not suggesting an optimum strategy at this point is that the principal concern of the vocational educator is presumably those students who are unable to make a satisfactory labor market entrance because of inadequate preparation. This strategy assumes society is less concerned with behavior modification of those who have been reasonably successful in the labor market than it is in improving the job coping capacity of graduates from courses with poor follow-up records.

Whereas an optimum oriented strategy would require a great deal of expensive data and analysis concerning work tasks, curriculum content, cost of training programs, employment forecasts, technological trends, etc., this suboptimal strategy says planners will not worry about curriculum design or training related placement for those courses which have turned out successful labor market entrants--because we have limited research and development resources--but for those programs whose graduates continue to experience labor market difficulties, program modification must be made and/or resources cut back.

Finally, this strategy recognizes that this is a relatively free society, which forces students into neither specific curricula nor jobs, which is very permissive concerning changes in

career plans, characterized by a flexible and mobile labor force, and contains a labor force within which career development is a sequential process not finally governed by student or parental decisions at the secondary school level.

An example of the oversimplified rationale that might support the previous training related placement strategy is illustrated here:

> Only 14 percent of young people become college graduates. Why not train the 86 percent so that they can answer the basic employment question: "What can you do?" (Widener: 79; see also Marland, 1971: 7).

Such arguments, however, seemingly overlook (1) the historical capacity of our industrial system to train labor within the firm and on-the-job; (2) the difficulty involved in forecasting employment by occupation (and the educational requirements for that occupation), so that once a person is able to reply "what he can do," there will be a job requiring those skills; (3) the flexibility of both individuals and industry to adapt their skills or job requirements to surmount labor market difficulties; and (4) the fact that the overwhelming majority of young people do find work. For example, 88 and 78 percent of the high school graduates and dropouts, respectively, aged 16 to 21, not going on to college, were employed in October, 1970 (Anne M. Young: 34). Apparently, at least four out of five youth responded to the "basic employment question" sufficiently well that they were able to hold jobs.

The labor market success planning strategy, then, recognizes this high degree of flexibility demonstrated by the American labor force and industry, recognizes the other subtleties between one's high school curriculum and his labor market success, and assumes that a first step in the evolution of an educational planning system should simply be to assure that graduates do have a relatively successful transition from school to work. After those programs facilitating, and those hindering, smooth labor force entry are identified, modified, and/or terminated, then energies should be directed to the fine tuning problems of relating training to placement.

Resource allocation under this labor market success strategy, then, would proceed as follows: (1) rank curricula according to say, the Curricular Priority Matrix (or cost-benefit or cost-effectiveness analysis, if resources are available), placing heavy weights on labor market success criteria (income and job satisfaction), and (2) working one's way down the ranks of the curricula from the highest to the lowest priority, each curriculum's maximum appropriation would be equal to the product of its annual

extracurricular cost per student times the expected number of interested students. Expressed in formula form this would be:

$$\text{MAXIMUM APPROPRIATION TO CURRICULUM X} = \left[\begin{array}{l}\text{EXPECTED}\\ \text{NUMBER OF}\\ \text{INTERESTED}\\ \text{STUDENTS}\end{array}\right] \times \left[\begin{array}{l}\text{EXTRA-}\\ \text{CURRICULAR}\\ \text{COST PER}\\ \text{STUDENT}\end{array}\right]$$

Note: Definitions for the factors here are the same as their definition under the "related placement strategy."

As discussed above under the training related placement strategy, there are various grounds for requiring some diversity in the set of programs provided to each area. Among the possible techniques for determining specific sub-ceiling funding levels for high priority programs (given the above ceilings) would be, as suggested above, utilization of proportions of net openings that may be funded, establishment of a minimum number of vocational education curricula for schools of given size and funding levels, and the use of area wage survey data. Experience will, of course, have to determine the best means for delimiting funds.

As discussed earlier, "interested students" in this strategy cannot be interpreted simply as enrollees. For example, if students are in a situation where only agricultural education is offered, in addition to the general curriculum, the fact that a substantial number of students enroll in the agriculture program cannot be interpreted as an endorsement of the value of the agricultural curriculum. Perhaps, given the option of a distributive education, trade and industrial education, or a technical curriculum, substantial numbers would switch enrollment. Thus, a critical instrument (as discussed in Chapter III) in this strategy is the curricular preference survey, which should be given to students at various levels in their educational career. The reason for administering the survey at several levels is to assess whether vocational interests change as one moves through the curricular program. In other words, if seniors typically, within the same program, have different career interests than sophomores, then some curricular changes may be in order.[16]

Under the labor market success strategy, when the labor market success of specific vocational education program graduates (e.g., machinist graduates) of given vocational interests and aptitudes is no greater than the job success of similar students from the general or college preparatory tracks, then the

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[16] It may be that between the sophomore and senior years, the students learn of opportunities that change their career interests. Perhaps presenting them with that information at an earlier date would speed up their career decision-making.

vocational education planner should seriously consider termination of supplemental vocational education funds to that program. The vocational programs generally are more expensive, and if they are not providing the labor market payoffs (the objectives of the strategy), there would appear to be little reason for continuing their subsidy.

PLANNING EXAMPLES

Training Related Placement Strategy

Step One:

Forecast annual net employment openings by occupations related to specific training curricula. This involves considerations of both supply and demand as discussed in Chapters II and III. As mentioned therein, sources that may be utilized to do so are data supplied by the United States Training and Employment Service and Bureau of Labor Statistics in conjunction with each state employment service (see above, Chapter III, "Net Training Related Job Openings"), data collected by the vocational education community itself--as in Oklahoma's OTIS project (Braden, Harris, and Paul), and the various supply estimation procedures described above. Hypothetical estimates are given in step two.

Step Two:

Rank the curricula according to some explicit set of criteria and a specific structure for their determination of priorities, such as the curricular priority matrix discussed above. The ranking below is from the hypothetical ranking developed earlier in this chapter. Variations in the criteria and their weights may lead to other rank orders of the same curricula.

Priority Number	Curriculum-Occupation	Estimated Openings
1	Machinist: Co-op Education	25
2	Computer Operator	200
3	Typist	900
4	LPN	75

Inappropriate for secondary vocational education (see discussion of the Curricular Priority Matrix above):
Registered Nurse
Nurse Aide
Machinist: Institutional (non-co-op)
Carpenter

Step Three:

Estimate the number of students at all levels in a specific program during a year necessary to fill the training related openings forecast for that curriculum.

CURRICULAR RESOURCE ALLOCATION:
RELATED PLACEMENT STRATEGY

RANK	OCCUPATION & CURRICULUM	STUDENTS NECESSARY TO FILL NET OPENINGS		PER STUDENT EXTRA COST	TOTAL PROGRAM COST	CUMULATIVE COST[17]
1	Machinist: Co-op Ed	100	×	$100	= $ 10,000	$ 10,000
2	Computer Operator	500	×	$400	= $200,000	$210,000
3	Typist	2400	×	$ 50	= $120,000	$330,000
4	LPN	150	×	$250	= $ 37,500	$367,500

Step Four:

Determine budgetary ceilings by working down the list of priorities until resources are exhausted. If, for example, the hypothetical state school system (for which the above data apply) had only $250,000 available for vocational education and decided to completely fund related openings, then this strategy would fund fully the top two programs and put the remaining funds into the typing program.

It is quite conceivable that, if the state school system has inadequate funds to support a sufficient number of high priority slots for all students, rather than fund completely all of the highest priority slots, some suitable mixture of high priority slots might be funded. (See the discussions above in this chapter under "Marginal Analysis" and "Training Related Placement Strategy.") This would avoid the total subsidization of a small cluster of jobs, industries, and/or interests. In this example, such a strategy might be reflected in the allocation of a total vocational budget of, say, $150,000, by allocating $5,000 to the cooperative machinist program and splitting the residual $145,000 equally between the next two priorities rather than giving it exclusively to computer operators.

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[17] If funding is according to this ranking and intends to fill all net openings with graduates.

Labor Market Success Strategy

Step One:

Rank the curricula according to some explicit set of criteria and a specified structure for their determination of priorities, such as the curricular priority matrix discussed earlier. The ranking below selects from the hypothetical ranking developed above. Variations in the criteria, their weights, and the process (e.g., additive or multiplicative) through which they determine the "Summary Index" may lead to other rank orders for the same curricula. Presumably, if one were implementing a labor market success strategy, one would place very heavy weights on criteria such as follow-up wages and job satisfaction rather than training related placements or net openings.

On the basis of wages and job satisfaction, utilizing the above hypothetical curricular priority matrix scores, a curricular ranking would be developed:

CURRICULAR PRIORITY MATRIX
(LABOR MARKET SUCCESS CRITERIA)

CURRICULUM-OCCUPATION: / PRIORITY CRITERIA:	Entry Income	5 Year Income	Job Satisfaction	SUMMARY INDEX	RANK
LPN	2	1	2	5	4.5
Nurse Aide	1	0	0	1	(6)*
Typist	2	1	2	5	4.5
Machinist: Co-op	2	3	2	7	3
Carpenter	3	3	2	8	2
Computer Operator	3	3	3	9	1

*Inappropriate for vocational education, as discussed earlier.

NOTES:

1. For details concerning these rankings, see the discussion under "Curricular Priority Determination," above.

2. It may be that, as reflected in the preceding table, separate sets of indices would have to be developed for women and men as the "female" occupations (health and secretarial) have traditionally not paid as well as male occupations and thus would come out with relatively low scores. To use such a non-sex specific index may bias training resource allocation to "male" occupations.

Having thus developed a curricular ranking through the use of relatively program specific follow-up data (or, if necessary, less specific sample data, generalized labor market reports, or guesstimates), and the curricular priority matrix (or its equivalent), one must then determine resource allocations to specific curricula.

Step Two:

As indicated above, this step is relatively straightforward. Resources are allocated to curricula in accord with their ranking, number of interested students, and extracurricular cost per student.

CURRICULAR RESOURCE ALLOCATION:
LABOR MARKET SUCCESS STRATEGY

RANK	CURRICULUM	PER STUDENT EXTRA COST		INTERESTED STUDENTS		PROGRAM COST	CUMULATIVE COST*
1	Computer Operator	$400	x	600	=	$240,000	$240,000
2	Carpenter	$350	x	500	=	$175,000	$415,000
3	Machinist: Co-op Ed	$100	x	200	=	$ 20,000	$435,000
4.5	Typist	$ 50	x	3000	=	$150,000	$635,000
4.5	LPN	$250	x	200	=	$ 50,000	

*If funding is according to this ranking.

Possible changes in curricular funding patterns as a result of the selection of alternative strategies are clear. Carpentry, for example, does not come out as well under the training related placement strategy as it does under this labor market success strategy. The machinist program falls to the middle of the

priority ranking, whereas it was formerly on top. Whereas under the training related strategy, $250,000 would have fully funded the machinist program, here machine shop might receive no funds.[18] As suggested above under the discussion of the "Training Related Placement Strategy" methodology, if one wished to avoid the possible unfortunate consequences of the full funding of a few programs, utilization of some proportion of net openings for occupations, establishment of a minimum number of vocational education curricula for schools of given size and funding levels, and the use of area wage survey data are among the ways one might determine sub-ceiling funding levels.

ADDITIONAL NOTES:

I. On Low Cost-Maximum Coverage/Labor Market Success Strategies

A variant of both strategies would be a strategy that would place high priority on the number of students covered by vocational education with the degree of labor market success providing a minimum criterion for the program. This strategy would, first, rank all curricula according to the matrix (omitting the cost criteria); second, group the curricula by cost (very high, high, . . . very low extra per student cost); third, eliminate those not providing some minimum degree of labor market success; fourth, fund those curricula with the lowest positive extra costs (costs above the general or academic costs) but highest matrix ranks, working down those low extra cost curricula according to their matrix ranking, providing funds to the extent of student interest (as a maximum) or the sub-ceiling limits discussed above; fifth, if sufficient funds exist, gradually work up to the more expensive curricula according to the same process.

Still another cost-conscious alternative strategy (say, "Moderate Cost/Moderate Coverage") would be to select programs with the highest curricular priority matrix rating within some cost constraint--say, costing no more than $200 to $500 more per student than general or academic programs. This would not necessarily maximize student coverage, but it might improve the quality of the program above the maximum coverage strategy.

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[18]The reader will notice that the resource allocations under the two strategies will be identical when (1) the curricular priority indices are based on similar criteria, and (2) the average annual number of students interested in the programs is less than the flow necessary to fill related annual openings.

II. On Priority To The Disadvantaged

As discussed above, it is critical that vocational education improve the quality and quantity of education it is providing to the disadvantaged. One way of so doing would be to provide access priority to the disadvantaged according to the probability of their experiencing labor market difficulty. "Access priority" here means not that students with a low probability of labor market success will be forced into vocational education curricula, rather, that if such students prefer the vocational curriculum, then they would be the first to be admitted to its enrollment (assuming they have the basic competence necessary to enable satisfactory achievement in that curriculum).[19]

Determination of the access priority to be given to each youth might be made through the utilization of empirical data--such as the work by Kohen (See the section "Efficacy in Serving the Disadvantaged" in Chapter III)--or a more primitive intuitional approach.[20] The former would determine actual success probabilities on the basis of a sample of labor market entrants through multivariate analysis of their aptitude, socioeconomic, and other handicaps. A more primitive approach would be an attempt on the part of the administration of the school to establish a ranking scheme based simply on intuition, such as the following:

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[19]"Basic competence" here means intelligence, not communication or arithmetic skills. If their specific supporting skills, such as math, are deficient, access priority would mean that supplementary courses would be provided to these disadvantaged youth to enable them to handle the central vocational curriculum to which they aspire.

[20]The Center for Vocational and Technical Education (at OSU) is also working on a taxonomy of the disadvantaged, which will shed additional light on this problem.

ACCESS PRIORITY INDEX

Each student would be scored on the basis of criteria such as those below and to the left, the sum of the points he receives (on the right) would yield his priority ranking.

Parent's Employment Status (No. of weeks unemployed during the past two years):	None	-1
	Some to 2	0
	3-8	1
	8 plus	2
Parent's Education (in years):	14 and over	-1
	12-13	0
	8-11	1
	Less than 8	2
Family Stress:	Both parents present	0
	One parent present	1
	No parent present	2
Primary Wage Earner's Income:		
	More than mean plus $2000	-1
	Between mean and mean plus $2000	0
	Between poverty level and mean	1
	Less than poverty level	2
Race:	White	0
	Nonwhite	1
Physical Handicaps of the Student:		
	No serious limitations	0
	Somewhat limiting	1
	Seriously limiting	2

The school system may not have an accurate assessment of all these criteria for all students, so it is clear that guesstimates will have to be made in many cases. It is believed, however, that such estimates may be necessary if such a redirection of vocational education to the disadvantaged is to be implemented. Although the guesses may result in occasional errors in priority scoring, such an attempt appears likely to redirect resources in the appropriate direction.

The general thrust of such an index, then would be to give relatively low admission priority to middle class whites from stable neighborhoods and relatively high admission priority to students from low income minority groups in neighborhoods with high stress. Low priority would be given to middle class white youth on the grounds that they (according to unemployment rates)

are not experiencing entry difficulties to the same degree true for blacks. Such priority to the disadvantaged might be provided only into, say, 50 percent of the vocational education slots to avoid problems of cultural isolation.

Obviously, one can raise important questions about both the criteria themselves as well as the appropriate weighting to be given to the sub-classes under each of the criterion. For example, one might question just how much of a handicap it is for a child or youth to have lost his parents. One might also question whether being black is no more of a handicap than having lost one parent or having a father who did not graduate from high school. The initial point to be raised, however, is whether or not such a priority index would be useful in channeling vocational resources to those who need them most desperately. Given agreement on the appropriateness of the index, one can then begin to refine the quality of the weighting.[21]

Finally, if a vocational education program (1) finds it has more applicants than dollars, (2) finds it necessary to screen, and (3) decides to deliberately include the disadvantaged, the question then becomes, which of the disadvantaged should be included. Arguments have been made to admit the most disadvantaged, and arguments are also evident supporting priority for the least disadvantaged. The first might be supported on the grounds of compassion for the underdog or the idea that society must, to remain civilized, express its humanity through assistance to the weak. The second, priority for the least disadvantaged, can be argued on the grounds of economic efficiency as well as, in the long run, compassion for the underdog. To clarify the latter, by concentrating training of the disadvantaged on the least disadvantaged of the disadvantaged, the poverty program may (a) maximize its impact on assisting people out of poverty--in terms of numbers enabled to earn non-poverty incomes, (b) maximize its demonstration effect--glamorous benefit-cost ratios for Congress and larger numbers removed from the poverty roles being more apparent to the disadvantaged themselves, and (c) the quick placement of those creamed from the ranks of the disadvantaged would mean more resources--more taxes due to smaller poverty rosters--could be concentrated on the residual severely disadvantaged in the future. Perhaps some combination

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[21]The reason that these admission priority indices are needed is that when vocational education planning takes place in a free society, it is assumed that one of the freedoms that should be extended to the student is the freedom to select his educational curriculum. That is, it is assumed that vocational curricula will not be forced on anyone, that the curriculum must be of sufficient interest to attract the student, otherwise, lack of motivation will result in the waste of educational resources.

(say, 10 percent severely disadvantaged, 40 percent disadvantaged, and 50 percent from the more advantaged groups) of the various subgroups would be optimal. In any case, the planners and advisory groups should be aware of the problems and prepare explicit strategies rather than simply letting their enrollments continue in the lopsided fashion true of the past.

III. On Employment Forecasting's Role Under Labor Market Success Strategy

If training related placement is not one of the more important criteria against which to appraise secondary vocational education, a careful reader may wonder why one bothers to forecast employment at all. Basically, such forecasts are important to provide information on labor market trends that will facilitate, first, intelligent individual career decisions, and second, to guide the general planning of educational and training programs. The forecasts are generally of less value when they refer to tightly restricted geographic or occupational concepts. The forecast is of increasing value where the training cannot easily be conveyed on-the-job and where the skill competency requirements are substantial (e.g., physicians). Such forecasts would be useful--especially at the post-secondary rather than the secondary level--for example, in the establishment of new programs, the success of which is unproven and for which developmental lead time is necessary.

IV. On Data Gaps

During the early stages of a planning system's adoption, much of the necessary data for implementation of the plan will not be available. The design of the plan itself, however, may help to bring into reality the availability of such data by pointing out their importance in the rational decision-making process. For example, in order to minimize the cost of training for a given level of skill competency or labor market success, costs of all potential means of training, competency and aptitude test scores, and student follow-up (wages and job satisfaction) would be ideal data. Not all school systems, very few, in fact, maintain program costs of particular skill training. Costs of training in industry, junior colleges, apprenticeship, etc. would also be required to optimize resource allocation. During the early stages of the adoption of the planning system's operation, however, assumptions, based on related studies and educated guesstimates, will have to serve, in many instances, as proxies for actual data. The importance of the data in the planning system should, in any case, serve notice that such information would be useful and suggest its collection in the future. Thus, the fact that not all of the data indicated in these chapters

currently exist, it is hoped, will not lead to rejection of the model as irrelevant but rather point to the necessity of (1) making estimates as reasonable as related research will support, and (2) taking steps for the development of the optimum data inputs for future planning.

A FINAL NOTE

The crises now facing our society are so straining our economic, intellectual, and moral fiber that we clearly cannot afford an ineffective or misdirected educational system. To direct our educational system, this report calls for explicit criteria for the allocation of educational resources, a careful examination of those criteria, and a thoughtful integration of those criteria into a planning system.

With regard to the strategies discussed in the previous paragraphs, the general and most important points to be made are (1) variations on these general themes are possible, probable, and likely to be necessary as well as helpful; (2) explicit criteria should be used to evaluate curricula; (3) explicit means for integrating alternative or simultaneous criteria into a summary index of priority clarify program decision-making and resource allocation and are thus viewed as essential; (4) for the same reason--to clarify decision-making--an explicit, first approximation, systematic approach to moving from evaluation (ranking) of curricula to funding is also essential, and the above procedures may provide such broad outlines for resource allocations; (5) when exceptions from the broad outlines are warranted, they should be funded, along with submission of explicit rationale for doing so; (6) when deviations from the rule become the norm, rather than the exception, the weights, criteria, and allocation techniques should be reexamined; and (7) to improve the base upon which the evaluation takes place, improved data systems are also necessary. The above strategies are simply suggested as two (of a wide variety of) possible planning systems that might make the vocational education planning process more explicit and responsive to society's manpower and human needs.

Finally, it should be noted that there are still other evaluation criteria with which the authors of this report have not dealt: minimization of delinquency; reduction of welfare roles; supplementation of the tax base; enhancement of cultural sophistication; stimulation of aesthetic development; and, perhaps most important, provision not necessarily of a uniform culture, but enhanced social cohesion, built upon an enhanced sense of awareness, understanding, and affection for one another.

Although these criteria were not included explicitly in this report, it is not at all clear that planning according to the

manpower criteria considered herein will fail to impact upon these additional concerns. The poor have little financial reserve for aesthetic development. Unless blacks, Indians, and other minorities are included in the American human resource development program and provided the vertical mobility they need for self respect, there will be little likelihood of their developing any affection for the dominant portion of our society. The tools for impacting upon these objectives are available. The will to do so must now be found.

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